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Paper Establishes New High Record in 1939

Production For the Year Is 13,441,000 Tons of All Varieties of Paper—Capacity of the Paper Industry and Its Actual Production Is Now More Than Twice That of the Industry Twenty Years Ago.

By M. C. Dobrow, Executive Sec., Writing Paper Mfrs. Association

The American paper industry in 1939 established a new high record of production. It was the third new high established in the last four years. 1936 production was the first year of the depression 30's to exceed the output of 1929. A substantial gain in the production of 1937 quickly set the 1936 record aside. Volume was depressed in 1938, but a new all-time high record was established last year when production gained 18 per cent over the 1938 volume and 5 per cent over the 1937 volume, the previous record figure.

It is interesting to note that in 1939 the capacity of the paper industry and its actual production were more than twice that of the industry's capacity and production of twenty years ago.

New high records were established in the printing paper fields, but the output of these divisions was only slightly higher than the volume in 1929. On the other hand, kraft paper and paper board continued the tremendous gains in consumption reflecting the new and growing uses for these products.

Because the paper industry is an old industry, it is not generally recognized that it too has in recent years made important contributions to the industrial and social welfare of the country to an extent favorably comparable to the contributions of the glamorous automobile industry.

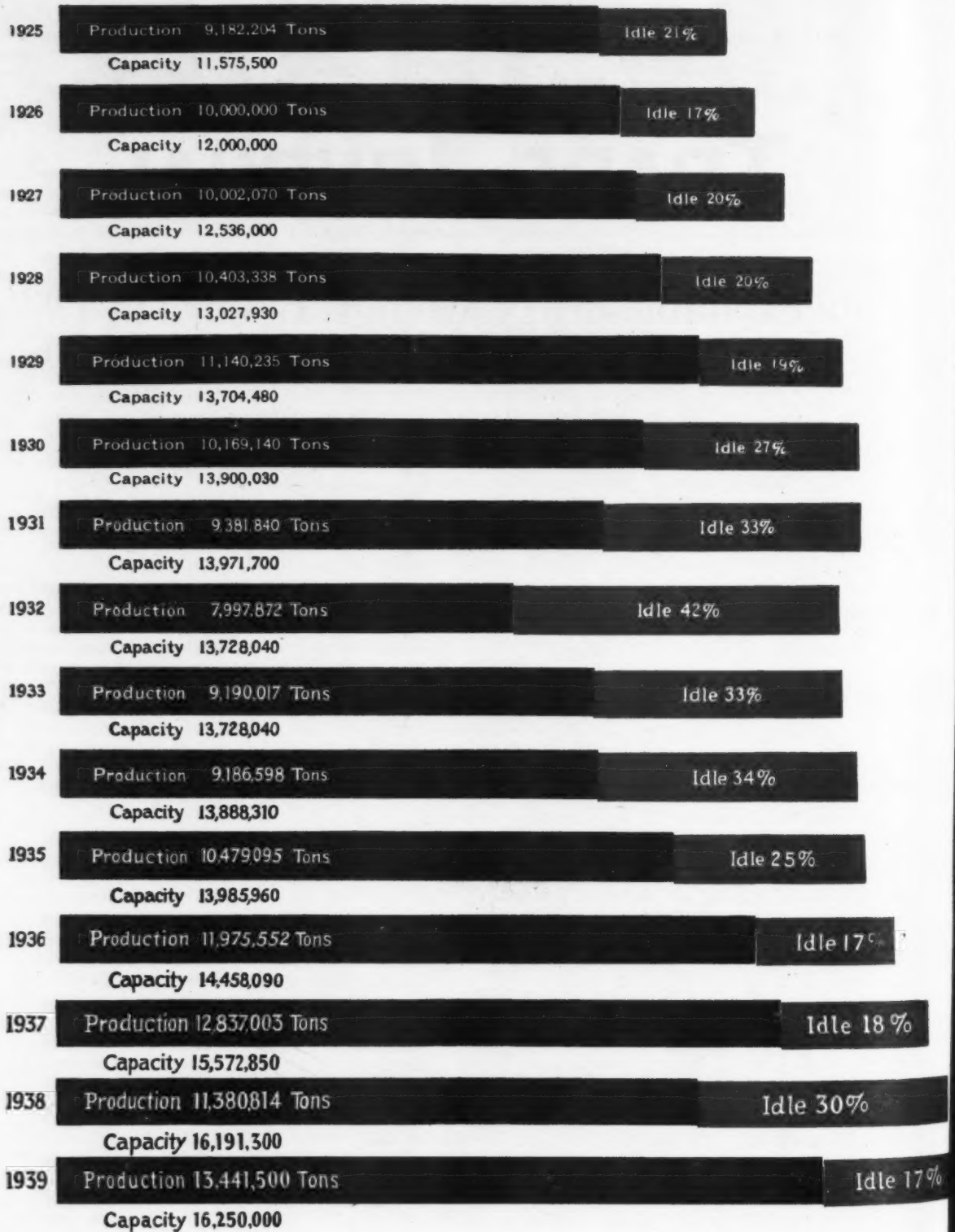
Paper production achieved new high records even during the so-called depression 30s. Technological improvements have resulted in higher qualities of product and lower prices per pound for the consumer to pay. Throughout this period when the trend was to greater production, constant improvement of quality and lowering of average price per pound, the general trend of the industry's employment has been upward. True, the industry produces more paper per employee than ten years ago, but increasing total production has overcome the technological unemployment which usually follows such development, to an extent that the industry at the end of the 30s decade employed 7 per cent more wage earners than it did in 1929. For these achievements the paper industry is justifiably proud.

In common with the gain in general business, the industry began 1939 at a considerably higher rate than the depressed volume of the early months of 1938. In midsummer, before the conflict began, it was evident that consumption was continuing at a higher level and that an active period was in prospect. Following the start of hostilities, there developed on top of this improved demand an hysterical wave of buying. This seemed to be based on the mistaken notion that the paper industry would not be able to take care of all consumption demands or that imports of necessary raw materials would be so sharply curtailed that mills would be unable to produce all the paper that the markets needed. The pyramiding of speculative orders in September and October almost made this seem a reality, but the often repeated statements by producers that the increased capacity of the industry was more than sufficient to meet all

TABLE I—U. S. CAPACITY AND PRODUCTION OF PAPER BY GRADES

Grade	1929 Capacity Tons	1929 Actual Production Tons	1929 %	1937 Capacity Tons	1937 Actual Production Tons	1937 %	1938 Capacity Tons	1938 Actual Production Tons	1938 %	1939 (Estimated) Capacity Tons	1939 (Estimated) Actual Production Tons	1939 (Estimated) %
Writing Paper	670,000	607,590	91	757,020	582,147	77	706,210	511,719	72	710,310	612,000	86
Cover Paper	32,000	28,072	88	40,300	24,437	61	35,000	20,216	58	35,000	21,500	61
Book Paper (Uncoated)	1,700,000	1,497,912	88	1,904,640	1,520,523	80	1,977,490	1,306,814	66	1,990,000	1,512,000	76
Wrapping Paper	2,000,000	1,605,783	80	2,351,660	2,053,387	87	2,503,560	1,865,856	75	2,503,560	2,214,000	88
Newsprint	1,695,080	1,409,169	83	1,000,370	975,854	98	960,380	832,331	87	965,380	963,500	100
Paperboard	5,696,870	4,451,187	78	7,168,130	5,802,036	81	7,535,790	5,103,767	68	7,535,790	6,100,000	81
Tissue Paper	442,680	387,811	88	648,210	540,152	83	668,980	548,943	82	672,000	626,500	93
Building	850,000	659,178	78	859,630	608,086	71	890,010	570,454	64	921,000	633,000	69
Groundwood				557,070	518,332	93	597,060	435,651	73	597,060	497,000	83
All Other Paper	617,850	493,533	80	285,820	212,049	74	316,820	185,063	58	319,900	262,000	82
Total	13,704,480	11,140,235	81	15,572,850	12,837,003	82	16,191,300	11,380,814	70	16,250,000	13,441,500	83

CAPACITY AND ACTUAL PRODUCTION OF PAPER MACHINES IN THE U. S. A.



Courtesy of M. C. Dobrow, Executive Secretary, Writing Paper Mfrs. Association.

of the consumption requirements in prospect finally was accepted and demand subsided.

Production in the last four months of the year was undoubtedly on a full capacity basis, and it was evident before the year was over that all of the paper produced could not be consumed at once. New orders declined and mills continued to operate on a relatively high basis through January 1940, when the abnormal backlog of orders was practically depleted.

Table I indicates the capacity and production by grades in the years 1929 and 1937-8-9, together with the operating ratios. It may be that the operating ratios listed for the industry and for some of the divisions are one or two points higher than indicated below. This is accounted for by the fact that the Census enumerates the capacity of paper machines in operation at the end of the year, and where a new machine has been installed during the year, all of its capacity was not actually available throughout the year. An adjustment of capacities for this lag might increase some of the operating ratios by a point or two at most in any particular year.

Capacity of the industry at the end of 1939 is estimated at 16,250,000 tons. Ten machines are now projected for installation in 1940. They will increase the total capacity of the industry to 16,420,000 tons.

Writing Paper Industry

In surveying the outlook for the writing paper industry during the period of the European conflict, there are two major factors which have to be taken into account.

(1.) What is the trend of domestic consumption, plus exports?

(2.) How will the European conflict affect the supply and cost of the basic raw material?

Consumption

The consumption of writing paper is to a large extent related to the general volume of business because these grades are largely dependent on the number of everyday business transactions. The Federal Reserve Board index of industrial production in 1939 was 22 per cent higher than in 1938, but it is not safe to assume that the consumption of writing papers made an equivalent gain in that period. The Federal Reserve Board index is made up of the operations of durable or heavy goods industries and non-durable or consumer goods industries. The increase or decrease in the durable goods industries does not have an important effect on writing paper consumption, because the number of transactions does not increase or decrease in direct ratio to volume. In the non-durable goods industries, however, there is a much more direct relationship of volume of production to the consumption of paper. The Federal Reserve Board index for the non-durable goods industries was 101 in 1938, and 113 in 1939 (1923-25—100), or a gain of 12 per cent. This is perhaps a more conservative basis for estimating the gain in writing paper consumption.

From these two indices it may be conservatively estimated that domestic consumption of writing paper in 1939 was at least 12 per cent higher than in 1938. Preliminary figures for 1940 indicate a continued high rate of consumption.

To changes in domestic consumption must be added the increase in exports of writing papers. For the eight months of 1939 prior to the conflict, exports of writing paper were at the rate of 2.8 per cent of domestic production. The rate of exports rose slightly immediately after hostilities broke out, and in December reached 6 per cent of domestic production. A further increase in this rate, or even a continuation of this figure, is an important addition to the total consumption of writing papers in this country.

Outlook for the Basic Material

Perhaps the most important single factor that will determine the course of the paper industry in 1940 or as long as hostilities last, will be the extent and type of warfare and blockade in the Baltic and North Seas.

Production of chemical pulp in the United States has increased substantially in recent years, and since the outbreak of hostilities domestic pulp mills have continued to operate on a full capacity basis. But this increased pulp production cannot be of sufficient importance to relieve the United States's dependency on normal imports. The United States normally imports from Europe 1,600,000 tons of chemical pulp, which is 25 per cent of the total domestic consumption. The United States also imports approximately 500,000 tons of chemical pulp from Canada. It is hoped that the conflict will not seriously interfere with the normal flow of imports from our neighbors in the North. All sorts of difficulties have developed to affect normal imports of pulp from European sources.

Wood Pulp Imports

December imports of pulp declined sharply from the volume of imports in November. Imports of unbleached sulphite from Europe were particularly disappointing, since some of the ships which Germany was holding were released in November in time for arrival here before the close of the year. Fairly large imports of Scandinavian pulps undoubtedly arrived here in January on those ships which Germany released in December following arrangements made with our State Department for furnishing of satisfactory evidence that this tonnage is for consumption in the United States and not for re-export to belligerents.

The following is a brief summary of chemical pulp imports from European and Canadian sources for September-December 1939, as well as in the previous two years:

U. S. IMPORTS OF CHEMICAL PULP
(In Short Tons)

	Source		
	Europe	Canada	Total
1937			
September	138,368	48,026	186,394
October	145,031	38,108	183,139
November	151,906	35,677	187,583
December	133,825	27,012	160,837
1938			
September	110,209	31,710	141,919
October	105,958	35,240	141,198
November	129,490	35,798	165,288
December	135,627	35,166	170,793
1939			
September	85,651	50,242	135,893
October	134,294	59,208	193,502
November	194,109	54,632	248,741
December	152,889	50,823	203,712

Shipments received from Europe during the first four months of the conflict were 18 per cent higher than in the corresponding period of 1938, but 1 per cent less than 1937. During this same period imports

from Canada were 56 per cent higher than 1938 and forty-four per cent higher than 1937.

Total imports from all sources for the four months were 26 per cent higher than in 1938, and 9 per cent greater than in 1937.

The substantial exports from the Scandinavian countries in the early months of the conflict were based upon production plus accumulated inventories. It is reported that these stocks have been depleted and shipments will now depend upon new production.

Sulphite Pulp

The following summaries of the total years' imports 1937-8-9 of bleached sulphite and unbleached sulphite explain the relatively easy situation in bleached sulphite and the comparative pinch in unbleached sulphite. These figures must, of course, be read in the light of the high volume of paper production in 1937, the depressed volume in 1938, and the all-time high production record in 1939.

Imports of Bleached Sulphite	Europe, Tons	Canada, Tons	Total, Tons
1937	225,457	286,504	511,961
1938	170,635	167,024	337,659
1939	221,143	252,720	473,863
Imports of Unbleached Sulphite	**Europe, Tons**	**Canada, Tons**	**Total, Tons**
1937	791,145	128,469	919,614
1938	601,697	86,625	688,322
1939	549,011	112,079	661,090

Total imports of bleached sulphite, from Europe and Canada, were 40 per cent higher in 1939 than in 1938, but 7 per cent less than in 1937. Imports of unbleached sulphite, both European and Canadian, in 1939 were 4 per cent less than in 1938, and 28 per cent less than in 1937.

SULPHATE PULP

Imports of Bleached Sulphate	Europe, Tons	Canada, Tons	Total, Tons
1937	56,650	55,501	112,151
1938	56,181	33,992	90,173
1939	62,113	45,839	107,952
Imports of Unbleached Sulphate	**Europe, Tons**	**Canada, Tons**	**Total, Tons**
1937	563,512	58,841	622,353
1938	377,906	48,181	426,087
1939	487,272	59,126	546,398

Total imports of bleached sulphate, from Europe and Canada, were 20 per cent higher in 1939 than in 1938, but 4 per cent less than in 1937. Imports of unbleached sulphate, both European and Canadian, in 1939 were 28 per cent higher than in 1938, and 12 per cent less than in 1937.

Finland's Part in the Picture

At the moment the situation for the American paper industry does not present any particular difficulty. The outlook is satisfactory for ample supplies until around midyear. Should hostilities continue into the spring and summer, a more difficult situation is undoubtedly in the making because it is practically certain that under the conditions currently existing and those which are to be expected, the recent volume of imports will be substantially reduced beginning in February and thereafter.

Finland is largely out of production. This will mean a loss of the greater part of the 315,000 tons of chemical wood pulp imported from Finland in 1939. More important, however, is the additional 1,000,000 tons of chemical pulp which Finland normally ships to other countries who in turn will have to enter the world market to make up most of this deficiency.

This curtailment of pulp exports from Finland is beginning to make itself felt, not so much in this market where shipments delayed by the German prize were delayed by Germany, have not been active purcourt in November and December have just arrived, but in other importing countries which have been more dependent on Finland. Domestic mills, having received substantial deliveries of pulp in ships which chasers of new supplies in the last few weeks. The pressure for purchases, however, from England, French and Japan has increased considerably and exports of American pulp are expected to increase.

Imports of chemical pulp into the United States from Germany, Austria and Czechoslovakia disappeared a while back. Imports from Roumania are declining to the vanishing point.

The Northern Conflict

In Sweden and Norway the situation has become more difficult. These countries have been forced to change their outlook on the war. Three or four months ago they felt sure that they could maintain their traditional neutrality and keep out of other people's quarrels. The events in Finland have forced them to change their minds. Although these countries hope that the Russo-Finnish war will be an isolated affair, they are now preparing for war. Reports from northern Europe indicate that Sweden and Norway, although officially neutral, are sending men and supplies to Finland's assistance. Such limited participation in the northern war may increase. It will undoubtedly have far reaching effects on the costs of pulp production in these countries, to say nothing of their ability to continue the production and export of wood pulp in volume sufficient to supply the urgent needs of their customers throughout the world. Scandinavian shippers recently announced assessments on deliveries under contracts prior to the conflict in Europe, as high as $10.00 to $12.00 per ton to take care of their increased cost of manufacturing. This is in addition to the upcharge of $5.00 to $8.00 per ton for the increased cost of freight and insurance.

Exports of Pulp

Pulp exports have increased substantially since the beginning of the conflict, but they had not, at the end of 1939, expanded to the extent which is expected. Pulp dealers have, however, estimated that exports for the first quarter will exceed 100,000 tons.

EXPORTS FROM U. S. A. OF DOMESTIC CHEMICAL PULP

(In Tons)

	1937	1938	1939
6 Months	115,943	74,031	39,511
July	34,117	7,345	11,030
August	29,773	5,116	10,946
September	33,383	5,146	16,873
October	27,817	5,505	21,622
November	27,443	6,190	20,985
December	33,580	37,151	18,537
12 Months	302,056	140,484	139,504

Pulp supplies from domestic production and imports are ample for the nearby term. Despite substantial increases in domestic and Canadian production, the outlook for adequate pulp supplies for next summer and beyond will become increasingly serious if the war continues, with all its difficulties in the Baltic Sea and in the Scandinavian countries.

North American Newsprint Production Up in 1939 But Below Record Year

By Royal S. Kellogg, Secretary, Newsprint Service Bureau

North American newsprint production in 1939 was 4,116,000 tons of which 2,869,000 tons or 69.7 per cent were made in Canada, 939,000 tons or 22.8 per cent in the United States and 308,000 or 7.5 per cent in Newfoundland. The total was an increase of 403,000 tons or 10.9 per cent over 1938 but was still 827,000 tons or 16.7 per cent below the peak production year of 1937.

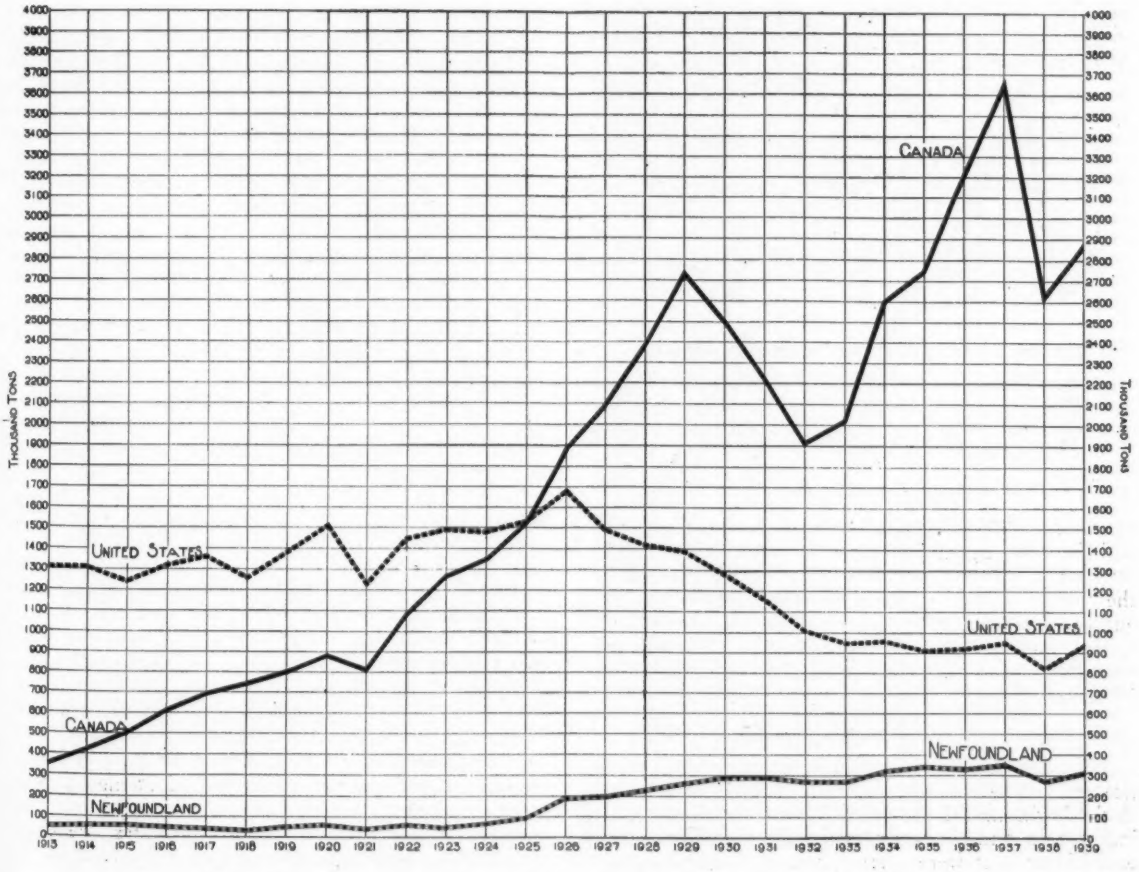
The gain in Canadian production last year over 1938 was 245,000 tons or 9.3 per cent; the increase in the United States was 119,000 tons or 14.6 per cent, and that in Newfoundland 40,000 tons or 14.8 per cent. The output in the United States was just about the average since 1932 which was the latest year in which one million tons was made.

Continental manufacture of newsprint paper last year was equivalent to about 73 per cent of capacity, but United States mills had considerably higher operating ratio than those in Canada. Mills of all grades in the United States which report to the American Paper and Pulp Association had an average operating ratio of about 85 per cent in 1939.

Shipments from North American newsprint mills during 1939 totaled 4,085,000 tons or 31,000 tons less than production. This discrepancy was due chiefly to conditions in Newfoundland since United States and Canadian mills combined shipped within 2,000 tons of as much paper as they made last year, so that for these mills stocks on hand December 31, 1939 were 182,000 tons compared with 180,000 tons a year earlier and were in no wise excessive.

Exports Up 9.6 Per Cent in Year

Exports of newsprint paper from Canada during 1939 amounted to 2,659,000 tons, a gain of 234,000 tons or 9.6 per cent over 1938. Of these exports, 2,206,000 tons or 83 per cent were shipped to the United States according to the Ottawa reports. This was a gain of 268,000 tons or 13.8 per cent over shipments to the United States in 1938. Overseas



NEWS PRINT PRODUCTION UNITED STATES, CANADA, NEWFOUNDLAND, 1913-1939.

exports of Canadian newsprint in 1939 were 452,000 tons, a decrease of 34,000 tons from exports in 1938, due of course, to hostilities abroad. For the same reasons overseas shipments from Newfoundland last year amounting to 177,000 tons were 27,000 tons less than in 1938.

The 452,000 tons of Canadian newsprint which went outside of North America last year were shipped to the extent of 177,000 tons or 39.2 per cent to the United Kingdom, 154,000 tons or 34.1 per cent to Australia-New Zealand, 54,000 tons or 11.9 per cent to Central and South America and 25,000 tons to Africa.

Exports of newsprint paper from the United States last year while only 13,000 tons, were 116.7 per cent more than the 6,000 tons exported in 1938. This is a good example of how misleading information might be given were one to deal only in percentages instead of actual quantities. Last year's exports of newsprint from the United States went most largely to China, the Philippines, Cuba, Central and South America.

Imports 74 Per Cent of Consumption

Imports of newsprint paper into the United States in 1939, according to official reports from Washington, amounted to 2,615,000 tons of which 84 per cent came from Canada, 12 per cent from Europe and 4 per cent from Newfoundland.

The 310,000 tons of newsprint paper which came into the United States last year from Europe were to the extent of 195,000 tons from Finland, 62,000 tons from Sweden and 42,000 tons from Norway. This was a gain of 44,000 tons from Finland and 31,000 tons from Norway over 1938 and a decrease of 10,000 tons in the imports from Sweden during the same period. Imports of newsprint paper from Germany totaling 6,000 tons ceased with the beginning of hostilities as did the importation of newsprint from France which prior to that time had been some 3,000 tons. There had also been 1,000 tons shipped from the United Kingdom to America before hostilities started.

Altogether imported newsprint constituted the equivalent of 74 per cent of United States consumption in 1939.

Stocks at Domestic and Canadian Mills

As previously noted, stocks of United States and Canadian mills on December 31, 1939, were 182,000 tons. On the same date stocks on hand or in transit to the newspapers reporting to the American Newspaper Publishers Association amounted to 326,000 tons, a total of 508,000 tons for the two groups. A year earlier the corresponding total for United States and Canadian newsprint manufacturers and A.N.P.A. publishers was 495,000 tons. On the other hand, at the current rate of consumption the publishers at the end of December 1939 had two days less supply than a year earlier. The stock situation is a normal one with nothing to cause any particular worry to either producer or user.

Consumption Up About 3 Per Cent in 1939

The consumption of newsprint paper in the United States in 1939 was not as great as many anticipated at the beginning of the year. Those who forecast an increase in general business activity of between 15 and 25 per cent were correct, but they did not guess rightly in assuming that such an increase in general business might bring an increase of 5 to 10 per cent in newsprint consumption. It was a reasonable expectation according to previous experience.

As nearly as can be estimated, approximately 3,550,000 tons of newsprint were used in the United States last year. This was a gain of about 3 per cent over 1938. Newsprint consumption and population in the United States yearly since 1924 are calculated as follows:

Year	Population	News Print Paper Used	
		Tons	Per Capita
1924	113,202,000	2,737,000	48.4 lbs.
1925	114,867,000	2,943,000	51.2
1926	116,532,000	3,307,000	56.8
1927	118,197,000	3,445,000	58.2
1928	119,862,000	3,515,000	58.7
1929	121,526,000	3,780,000	62.2
1930	123,091,000	3,563,000	57.9
1931	124,113,000	3,245,000	52.3
1932	124,974,000	2,840,000	45.4
1933	125,770,000	2,690,000	42.8
1934	126,626,000	3,058,000	48.3
1935	127,521,000	3,300,000	51.7
1936	128,429,000	3,650,000	56.8
1937	129,257,000	3,830,000	59.3
1938	130,215,000	3,458,000	53.1
1939	131,125,000(?)	3,550,000	54.1

There is a slight uncertainty about the 1939 population figure used in the foregoing table because the Census Bureau in Washington made no estimate as of July 1 that year as is customary. It is not far from correct, however, on the basis of recent population trends.

Among the reasons for the comparatively small newsprint consumption last year were the small increase in newspaper advertising, the numerous suspensions or mergers of daily papers and continued reductions in roll widths and other economies by publishers. The use of narrower rolls by publishers is probably equivalent to a reduction in consumption of 8 per cent compared with the roll widths used 20 to 25 years ago. A striking example of this kind is furnished by the *Daily News*, New York's well-known tabloid. By putting the date line at the side instead of at the top of its page, the *Daily News* estimates a saving in consumption of over 3,000 tons of paper per year through the use of a 61-inch instead of a 62-inch roll.

Newspaper Circulations Gain

The compilation of net paid circulations of English language papers in the United States recently completed by *Editor and Publisher* is most interesting. Covering 1,888 dailies it shows a total of 39,670,000 copies during the year ending September 30, 1939. This was a slight increase over the circulation during the preceding year, notwithstanding 51 cases of suspensions or mergers—mostly the former—during 1939. On the other hand, 524 Sunday newspapers during the twelve months ending September 30, 1939, had aggregate circulations of 31,519,000 copies. This was 3.4 per cent more than during the preceding year and the largest Sunday newspaper circulations ever reported, exceeding by 17 per cent the number of copies circulated in 1929. Daily circulations were also slightly more in total than in 1929, the loss of 3 per cent in the evening papers during the ten years having been more than counter-balanced by the gain of 7 per cent in the circulation of morning papers.

Notwithstanding the mortality in the daily publishing field, there was a net increase of 86 newspapers in the United States last year according to Ayers' Directory. The combined total of dailies, weeklies, semiweeklies and triweeklies is said to be 13,281.

Altogether the figures upon newspaper circulations

are encouraging for prospects of newsprint consumption whenever there is substantial gain in advertising volume. Until there is such gain, circulation increases are of little consolation to newspaper publishers.

Advertising Gains Small

Advertising last year was conspicuous in two ways, i.e., the slight increase in printed advertising and the large increase in radio advertising. The former was not encouraging to the manufacturers of the paper used by newspapers and periodicals.

Newspaper advertising in the 60 cities covered by the compilation of Media Records increased 1.6 per cent in 1939 over 1938. There were four months—January, February, September and November—in which newspaper advertising linage was less in 1939 than in the corresponding months of 1938, and even in December when there was a larger retail and Christmas trade there was no more newspaper advertising last year than the year before.

Periodical Advertising Gains

Periodical advertising last year ran much the same course as newspaper advertising with an aggregate linage of only 2.8 per cent more than in 1938. There were decreases in January, February and March compared with the previous year and heavy gains in July and August which were offset by much smaller increases later. January 1940 started off a little better with an increase in periodical advertising of some 5 per cent over January 1939. However, January 1939 was 15 per cent below January 1938.

Different Story in Radio

When we come to radio we get a different story. In every month last year radio advertising revenue was greater than in the corresponding month of any preceding year, so predictions as to the saturation point in radio publicity will have to be made by someone with more temerity than the present writer.

The reported expenditures by advertisers for radio time over the National, Columbia and Mutual networks last year were $83,114,000 or 16 per cent more than in 1938. The national total expenditures for radio advertising in 1939 including minor chains, local stations, talent and follow-up might easily have been $180,000,000 or 30 per cent more than the amount spent for advertising space in magazines.

Nearly all of the products largely advertised by radio are consumers' goods. Since the increase in the consumption of consumers' goods in the United States in 1939 was probably not more than 10 per cent and there was a 16 per cent increase in the advertising of such goods over the radio, it is reasonable to conclude that this accounts to a considerable extent for the failure of newspaper and periodical advertising to increase proportionately last year.

Outlook Generally Favorable

The first quarter of 1940 in the United States opens with extensive and varied industrial activity carried over from the last quarter of 1939—and the spark which started that was the outbreak of hostilities in Europe. How long this activity will continue is utterly beyond prediction. Temporarily, as expected, there is some slowing up from the December pace. It seems certain that there will be a large steel output this year, that automobile production will be in heavy volume and that aircraft and shipbuilding will go to new levels. The railroads have the most freight cars on order in fourteen years. The greatest demand bank deposits on record and low money rates might be the basis for great business expansion.

There is substantial basis for the opinion, however, that there will not be sustained general business improvement—aside from specific war cases—until there is a sustained rise in commodity prices. Commodity prices rose quickly following the outbreak of war in Europe but the rise was not great and since then there has been much wavering in price levels. Now they are about 7 per cent above this time last year. It does not appear probable that there will be any large and general increase in commodity prices for some time to come. Such current buying as there is in the United States is on no such extravagant and erratic basis as during World War I. There is also the very general desire and disposition to avoid the excesses which characterized many price situations the other time. The accompanying chart shows that newsprint prices have been below the wholesale commodity price level since 1932.

More Fiction Than Fact

Throughout 1940 we may expect to hear frequent repetition of the time-worn statement that business is bad in an election year. This, however, is more fiction than fact. Charts of every presidential election year since 1900 show that ups and downs in such years follow no general rule whatever. There have been presidential election years in which business improved straight through; others in which it fell off; and others in which it went both ways. The more generally conservative trend which is becoming evident in United States politics should, if anything, be encouraging to business in 1940.

Book Paper Output Increases

Production of uncoated book paper in 1939 amounted to 1,377,000 tons. This was 19.5 per cent greater than in 1938, but 2 per cent less than in 1937. Production of coated book paper in 1939 amounted to 290,000 tons, this being 24.5 per cent greater than in 1938, but 10 per cent less than in 1937.

The first nine months of 1939 production of uncoated book paper was about 14 per cent greater than in 1938, but commencing with October the percentage jumped to over 30 per cent above the previous year, which percentage was maintained for the balance of the year. For the first 8 months of 1939 orders and production were about the same, but in September, with the outbreak of hostilities in Europe there was a large increase in orders that was maintained during October. This backlog of orders, established in September and October, was responsible for the high rate of production during the balance of the year.

Shipments of uncoated book paper in 1939 were 20.3 per cent greater than 1938, but dollar sales were only 13.5 per cent greater, the difference in these two percentages being due to the fact that the average price per pound in 1939 was 6 per cent less than in 1938. During January 1940 production continued at a high rate, but orders have been falling off and it is probable that during February production will fall off from the January rate, but on the other hand it should shortly again rise due to the seasonal trend that usually occurs in March and April.

Active Demand Creates Strong Pulp Market With 19 Per Cent Price Rise in 1939

By O. F. Swanson, Sales Mgr., J. Andersen & Co., and the Pulp and Paper Trading Co.

Despite certain unfavorable features throughout the year of 1939, the wood pulp industry continued to develop in momentum. This is especially true with regard to the South, where the production increased considerably but, as it was largely consumed by the paper and board mills connected with producing pulp mills and subsidiaries, its direct effect on prices of pulp in the markets at large was rather negligible. On the other hand, the indirect effect caused by the large tonnage of products manufactured there from their own pulp and widely distributed in many markets undoubtedly exerted great influence on the pulp business in general. As a matter of fact, probably more than is generally conceded. With the outbreak of European hostilities on September 1, higher prices were anticipated and moderate advances followed on both domestic and imported pulp.

Pulp Prices Increase Moderately

The primary factors for only modest advances were the increased activity in shipping during October and November, the substantial tonnage of chemical pulp on dock at Atlantic and other ports, at consumers' mills and warehouses, and the usual reluctance of American pulp manufacturers to support any move which might have a tendency to encourage rapid advances and high prices. They have succeeded remarkably well in keeping prices on all domestic grades on a fairly even keel and, by so doing, assisted in regulating prices on imported pulp as well. It is also reasonable to assume that the price level on paper and board, together with economic conditions of the paper industry on the whole did not permit it to absorb greater increases, and we must not overlook the fact that the majority of pulp manufacturers, whether on this side or abroad, earnestly endeavored to cooperate with their customers, in order to assist them as far as they possibly could by reducing prices and deferring shipments on contracts, etc. This cooperation on their part was in most instances genuinely appreciated, and tended to retain the goodwill of the buyers. The majority of them reciprocated by adding tonnage for forward deliveries at revised prices. Although this procedure did not meet with approval of all buyers, it appeared to be the best solution offered at the time to ease the lingering headaches caused by the hysterical buying spree about two years ago. It is fervently hoped that this splendid cooperation by all concerned will be permitted to continue, but present signs indicate approaching obstacles which might make this very difficult and perhaps impossible. Should the European conflict last for some length of time, there might eventually be a shortage in some grades of chemical pulp, resulting in higher prices before its termination.

Cooperation of All Interests Needed

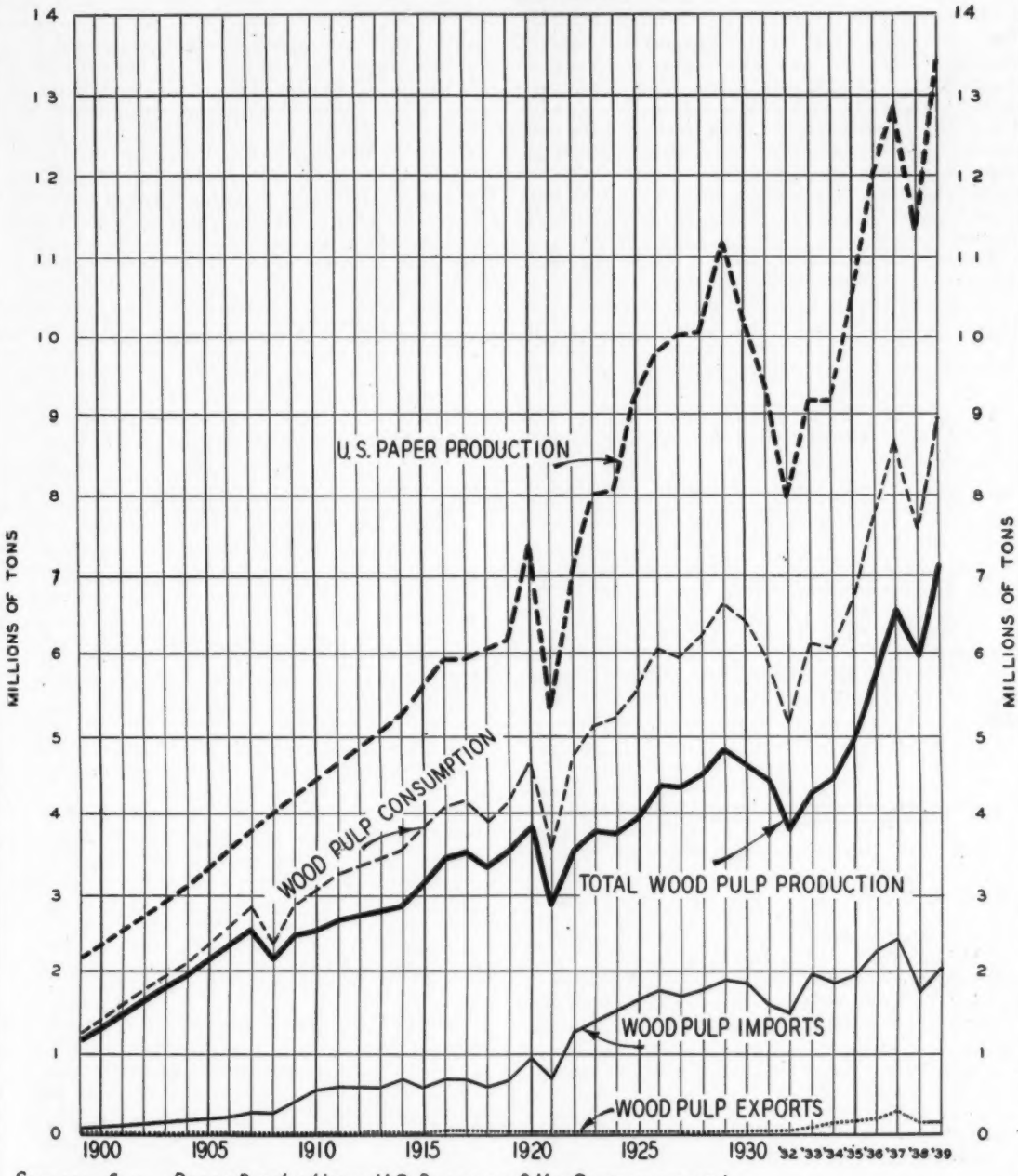
In the meantime, there seems to be at least one policy which everyone, whether buyer or seller should pursue: do the best we can, and continue to carry along on the present course by providing our customers regularly with adequate information and allow them reasonable time to readjust their own problems before arriving at definite decisions on any propositions submitted to them and, particularly concerning further commitments. And, something else, there must be no struggle between rival interests because the pulp and allied trades are just like one big family where the wellbeing of all its members is essential for the ultimate success of the entire body. Illness in any one group will jeopardize the productivity of the whole industry. For several years past, occasional sparring bouts have occurred between, should we say, the "have" and the "have nots." The first group belong to the paper and board mills equipped with facilities to manufacture their own pulp, the second are those hundreds of paper and board mills, scattered throughout the land, obliged to purchase their requirements of pulp wherever they can at best prices possible. Many of these mills are not large but, nevertheless, very important indeed to the communities in which they are located, inasmuch as they are frequently the only source of livelihood and steady income for the working people there. So, while a certain group in the industry might be in favor of further concentration and localized expansion, which would subsequently further reduce the number of units of so-called converting mills, a large majority of American paper and board manufacturers are vigorously opposing such a move. Evidently, it is about time to consult a few new doctors to make diagnosis of the patients before more checkouts on account of old age, or other alleged and imaginary infirmities are resorted to. Certainly numerous of the "have nots" are still in robust health and are perfectly capable of carrying on under present conditions, but what would happen to them if prevented from securing their wood pulp supply in the open market and at prices at least in the approximity of the actual costs of the pulp used by paper and board mills making their own, is easily visualized, and no braintrust is required to figure this out.

New Sales Exceptional in 1939

Strictly, new sales of important tonnage of imported pulp were very exceptional in 1939 and the sellers usualy increased tonnage booked by conversions of existing contracts. This probably was to some extent responsible for reopening the campaign waged off and on for years by some large American pulp and paper manufacturers against the importation of pulp, and strenuous efforts were made to prevail upon American authorities to apply the Anti-Dumping Law to imported pulp. This was met with stubborn resistance on the part of the so-called converting mills, which do not produce pulp and, as satisfactory evidence was apparently produced by them to convince the authorities that no dumping of pulp had taken place, this matter was subsequently dropped for a

TOTAL WOOD PULP PRODUCTION, CONSUMPTION, IMPORTS AND EXPORTS AND TOTAL PAPER PRODUCTION

OF THE UNITED STATES



Sources for Paper Production - U.S. Bureau of the Census except 1924, 1926 & 1939 estimated by American Paper & Pulp Association
for Pulp Production - 1899-1938 U.S. Bureau of the Census
1939 estimated by U.S. Pulp Producers Association
Imports & Exports - U S Bureau of Foreign & Domestic Commerce

UNITED STATES PULP PRODUCERS ASSOCIATION

while, and an official statement was issued that the dumping investigations would cease for the time being. The fight will probably flare up again at some opportune moment because some American pulp and paper producers still fear that this market might be flooded with foreign pulp when peace in Europe has been re-established. The converting mills do not believe that anything like that will happen at all but on the contrary that it will be to the advantage of the entire paper trade to obtain essential raw materials and especially Wood pulp from several sources, thereby enabling not only them, but all the American paper and board mills to compete on a fairly even basis in this and other markets. At the time of writing, no final conclusion has been reached in the matter, and probably won't for some time. Should the exports of rayon pulp increase to Japan and other countries, which it probably will, this would have a tendency to lessen the tension in certain quarters against imported pulp and as the outlook in the rayon and staple fibre industries has fortunately improved, perhaps the crisis has already passed.

Current prices at the end of 1939 averaged about 19 per cent higher than at the beginning of the year, and this fact should also help to ease the minds of those fearing dumping of imported pulp. Don't let us ever forget that what is good for the paper industry at large, should also be good for the whole country, and I am sure that we are all striving to achieve this but sometimes find it extremely difficult to agree on methods to be used to reach the goal. To fill American requirements, and the possible shortage of pulp, which would no doubt result in severe restrictions on the importation of both chemical and mechanical grades, an immediate increase of the domestic production of at least 25 per cent will be required and other increases would necessarily follow from year to year in order to keep pace with increases in production of products manufactured from Wood pulp. Whether this could be accomplished without eventual injury to the forests in certain sections of the country is very doubtful. Over a period of years, strenuous efforts have been made to preserve the forests as much as possible and considerable and diligent research has been done by both individuals and organizations for the purpose of finding ways and means to do this as well as to build up our woodlands, and it is gratifying to note that many large operators in the South, on the Pacific Coast and elsewhere have inaugurated rigid conservation programs for reforestation of pulpwood and other forest products. Perhaps sufficient tonnage of pulp could be manufactured in the United States to cover its requirements, without the eventual depletion of the forests but, before venturing on an enterprise of this magnitude, every phase and possible angle of the situation should be scrutinized impartially, widely and most carefully. Some folks seem to think that the devastating floods and dust storms of recent years were to a great extent augmented by the depletion of forests in certain territories. Be that as it may, any country blessed, as we still are, with sizeable forests will do well to nurse them along most carefully.

Quality of Sulphite Little Changed

No particular improvement took place in the quality of either unbleached or bleached sulphite last year and, unless something unforeseen should occur in the way of new technical discoveries or mechanical inventions to improve present methods of manufacturing, no great material change in these grades can be expected. They appear to have practically reached the saturation point in quality under present conditions. On the other hand, kraft pulp, both unbleached and bleached, made noteworthy progress in this respect, and several domestic and imported brands of bleached kraft are now considered indespensable in the manufacture of paper where a few years ago, it would have been inadvisable to use them. The United States and Finland have probably made greatest progress in the development of sulphite in recent years, and built up the enviable reputation of supplying a wide range of excellent qualities, all of which have proven very suitable in this and other markets. This is particularly true with regard to the Pacific Coast and the way the pulp business is handled there is also a credit to the entire industry. The United States, Canada and Sweden have undoubtedly advanced furthest in the science of manufacturing unbleached and bleached kraft pulp, and the tonnage produced in these countries of bleached kraft has been more than doubled during the last three years. Regarding other grades of pulp, the United States, Canada, Norway and Sweden concentrated on maintaining the quality of their well-known brands which have been so successfully used by paper and board manufacturers here and elsewhere over a period of many years, and are so well known throughout the trade that further comments on them are not necessary. Rejections of shipments on account of inferior quality were almost unheard of last year. In comparison with other years, consumption held up beyond expectation from a tonnage standpoint but, despite this it was on the whole a rather disconcerting and dismal year for the sellers who were taxed to extreme limits to readjust their business in conformity with drastic changes in their markets; and severe price reductions in conjunction with other difficulties made their lives miserable the last two years. Owing to hostilities in Europe, Finland has been and still is suffering most of the pulp suppliers, and the invasion of that country by Russia practically eliminated her as an exporter of wood pulp to the United States and to other countries overseas. So far Sweden and Norway have been able to stay out of the conflict and continue shipments, but there is great danger of their also becoming involved. Should this happen, the paper industry throughout the world would be even more seriously effected because the combined tonnage shipped here and elsewhere by these countries under normal conditions is larger than that of Finland.

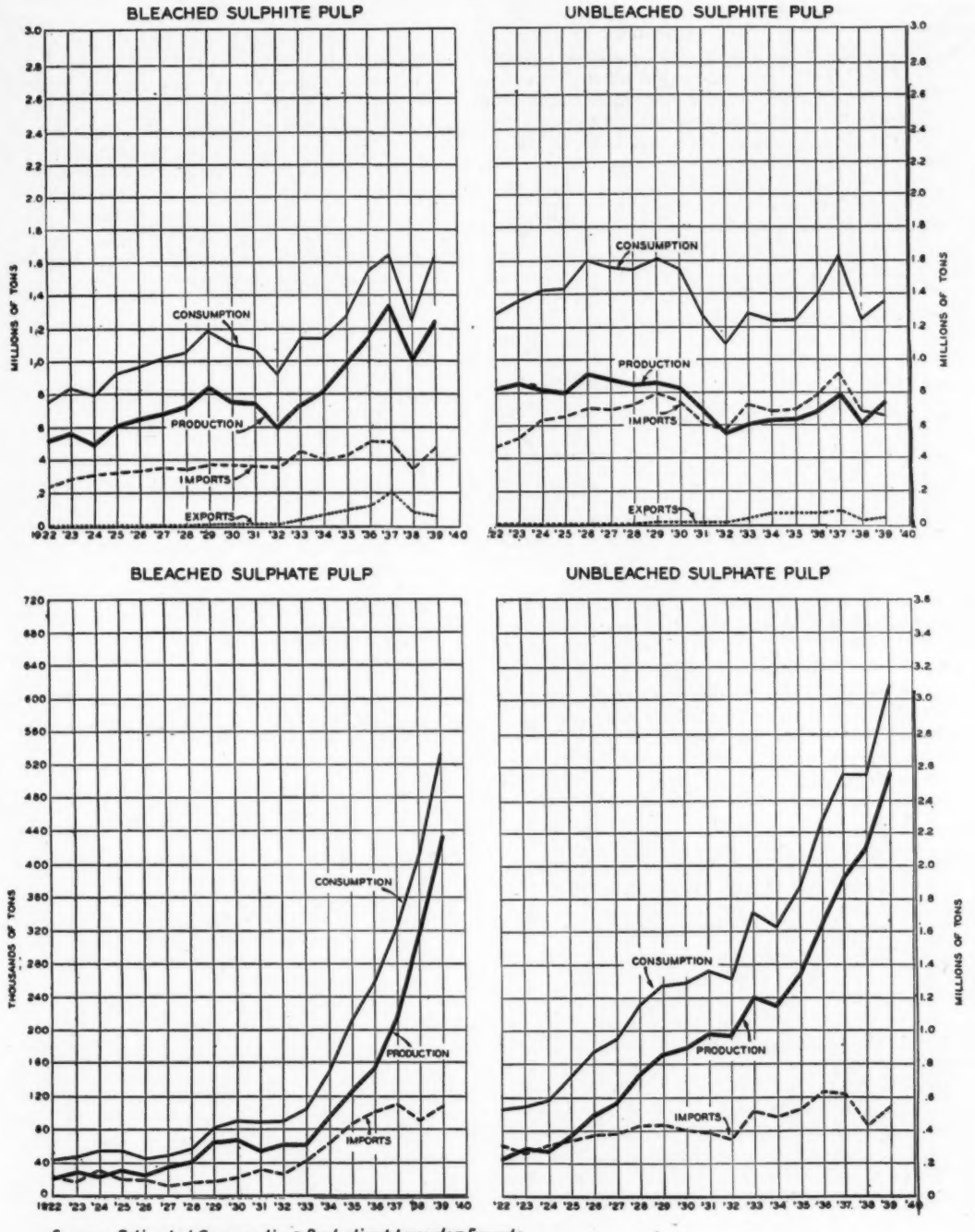
Pulp Imports Rise in 1939

The total imports of chemical and mechanical pulp into the United States last year is calculated to have reached the imposing figure of 2,026,209 tons, as per official Government statistics compiled and issued by the United States Department of Commerce in Washington. According to these figures compared with 1938 imports, last year exceeded its predecessor by about 15 per cent in tonnage. Sweden, as usual, was the foremost pulp exporter, and supplied the United States with about 870,000 tons. Canada was second with about 640,000, Finland third, with about 335,000 tons and Norway fourth with 95,682 tons. All other countries combined supplied about 83,000 tons. The tonnage from Central Europe decreased last year and will undoubtedly continue to shrink throughout the

UNITED STATES

PRODUCTION, CONSUMPTION, IMPORTS AND EXPORTS

OF



Sources: Estimated Consumption = Production + Imports − Exports
Production 1922-1938, U. S. Bureau of the Census
Production 1939 Estimated by U.S. Pulp Producers Association
Imports and Exports - U.S. Bureau of Foreign & Domestic Commerce

UNITED STATES PULP PRODUCERS ASSOCIATION

duration of the war. However, the reduction in imports from these countries is insufficient to create an actual shortage of wood pulp in this market but, as already intimated, if Sweden, Canada and Norway should be forced to curtail their exports to a great extent or, worse yet, be entirely removed as suppliers, we can then look for severe scarcity in some grades. This situation might, however, be partially ameliorated by the important decrease in tonnage of pulp previously used in Japan and elsewhere for the manufacture of artificial silk and staple articles. It is estimated that Japan alone has curtailed her imports of pulp the last two years for this purpose by about 40 per cent. Hence, it is likely that any decrease in tonnage of Rayon pulp will make available an equal increase of pulp for the paper industry because the pulp mills, equipped to manufacture so-called Rayon pulp can, without exception, also make pulp for papermaking, but no pulp mill should ever attempt to produce "Rayonpulp," if not fully equipped both technically and mechanically to do so.

At the present time there is a generous supply of wood pulp on this side and as a consequence, the buyers have decided that it would best serve their interests to follow a more cautious policy than they did during September, October and November of last year. Many users are reported to have ample supply of wood pulp at their mills and warehouses to cover their requirements for about a year ahead and the majority are well supplied for several months. Owing to the uncertainty concerning costs of manufacturing, freight and insurance, it has been impossible for several months past, and still is, to quote firm prices on imported pulp, whether on contracts or spot tonnage, until these charges have been revealed to the sellers and then only on shipments over short periods. In many instances, 30 days is the fixed price limit and although a few American and Canadian sellers are also quoting on this basis, the majority are still adhering to their former and quite customary practice of booking tonnage for one year, subject to quarterly and mutually satisfactory price agreements about 30 days in advance. As far as the buyers are concerned, this procedure is the most popular right now, and some of them claim that monthly quotations on raw materials places them in a position akin to gambling because of their unavoidable obligations to customers to protect them on prices over longer periods on finished products, from which there is apparently no escape except in singular cases. These, as well as other problems will no doubt be ironed out eventually but, for the time being, it is by no means certain that this can be done in the near future. Owing to market fluctuations and weekly advices in the trade papers, quotations on pulp are omitted in this article. Nevertheless, it should be in order to mention that they are still within reasonable bounds. Should the demand for pulp continue at about the rate prevailing since September of last year, or increase in activity, prices are then bound to advance sharply before new tonnage is available for sale unless, of course, hostilities should terminate unexpectedly and from a humanitarian point of view, let us hope it will be soon, but I don't think that "the bottom will fall out" as it did following the last upheaval, although the supremacy of the old rule of supply and demand will undoubtedly dictate its whims and fancies, trials and tribulations with even greater force than it does today. Exports of wood pulp from the United States, the greatest pulp producing country in the world, registered a very slight loss in tonnage in 1939, as compared with the preceding year and, according to available reports, the total exports of all grades during 1939 was 139,504 tons, valued at $6,493,140.00, compared with 140,484 tons, valued at $9,986,826 for 1938, which indicates a decrease in value of 34.80 per cent.

It is customary at this time, after having endeavored to review results of the past year's activities to express an opinion concerning the outlook for the coming year but to make predictions today about the future course of the pulp business is utterly impossible because of imponderables which can only be tackled as they appear with the march of time. However, if we can judge from past experiences, under somewhat similar conditions, present signs indicate increased activities, higher price levels and stronger demand ahead of us but, regardless of any developments in the business—good, bad or indifferent—we do know that no one living in the United States or, for that matter, anywhere on this continent, can even attempt to fully appreciate the blessings of this great privilege.

Forest Resources of W.-C. Alabama

E. L. Demmon, director of the Southern Experiment Station in New Orleans has just released a report on the "Forest Resources of West Central Alabama," which is the 48th in the Station's series of survey releases describing the timber situation in different sections of the lower South.

Nearly 62 per cent of the gross area of approximately 4,400,000 acres in this survey unit is in some stage of forest growth, with the pine and pine-hardwood type groups together covering 70 per cent of the forest area. More than 90 per cent of this area is characterized by second-growth stands; nevertheless trees of the size and quality to produce lumber contain nearly 5 billion board feet lumber tally. The report shows that in trees of all species and qualities and in all sizes 5 inches d.b.h. and larger, there is a volume of usable wood amounting to 32½ million standard cords, of which nearly 60 per cent is hardwoods.

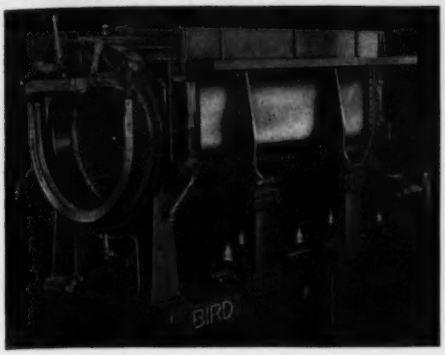
For the three-year period ending December 31, 1937, the saw-timber component of the growing stock decreased approximately 1 per cent due to the effect of cutting for lumber and other uses, and to mortality due to fires, insects, and diseases. In the same period, however, the entire growing stock, that is, trees all diameters 5 inches and larger, showed a net increase of more than 3 per cent.

There is both opportunity and need for more industries in this section designed to use wood from trees of small size and low quality, particularly trees of the hardwood species. Because of its nearness to the electric power development of the TVA and to the coal fields of the Birmingham region, and because of good transportation facilities by rail, highway, and river, the area is favorably located for industrial development.

Paper Box Shipments Higher

Shipments of folding paper boxes into the metropolitan New York area during January totaled $750,814, compared with $708,655 in December and $587,552 in January, 1939, it was reported by the Folding Paper Box Manufacturers Association, Inc.

SPEAKING OF CONVENTIONS:



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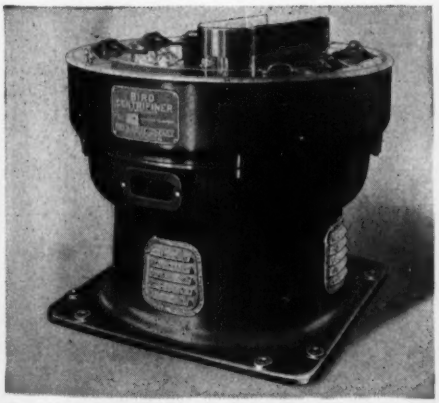
The BIRD PURIFINER—to effect thorough and continuous removal of both light and heavy dirt by employing sharp differences in pressure of the paper stock itself. Simple, compact, no moving parts—the most recent advance in dirt removal equipment.



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BIRD MACHINERY

Increased Demand From Mills Sends Prices of Paper Making Materials Upward

By Walter R. Hicks, Jr., of Daniel M. Hicks, Inc.

Without actually referring to last year's effort, the closing remark rears it's head, unbidden and with a certain arrogance. It concluded a rehearsal of events in the paper making raw material markets which just didn't happen, and with a tinge of the foreboding which such dead calm seems to foment said in effect "——— and if the price of mixed is all that we have to worry about this time next year, I suppose we'll be very fortunate."

Here it is "this time next year" and like all "todays" its thoughts, feelings, joys, sorrows, hopes, fears and expectations submerge those of the "yesterday" completely, or at least to the point where we scarcely remember what we hoped for, or what position we wished to find ourselves in now, when we looked ahead, "this time last year." That of course, as the professional and even the bar stool philosophers say, is life. Our collective human natures' inclination to lose no time in finding new things to hope for and new things to worry about (which always seem more important than any of those previous) seems to make the world go 'round—does it not? Those problems that we fail to crack which do not solve themselves are soon replaced or linger and become a part of our accustomed lives, like a dog's fleas. We who are concerned with paper making raw materials have these problems and, of course, a brand new crop of replacements or additions.

This year the "replacements" are happily for our industry, but unfortunately for the world at large, mostly problems which the whole world shares. They are not of our industry's making, nor do they affect us more critically than they do our fellow industries, at home and abroad, nor our fellow man of any epidermal tint. For they are the problems which our sick old globe, with its seemingly diminishing centrifugal action, cannot seem to shake loose. But then we are enough aware of these to pass on, with a nod or bow in whatever part of the shame is ours individually, to the "flea" problems of our own particular field; to a brief account of the year's prices of rags and paperstock, and to that solemn moment in the end when we pray that the Lord will just take a look at Roofing and start figuring something out.

September "Boom" Sends Prices Upward

First let us consider what is called "the Market." As such, and on the whole it was characterized by one and only one departure from a calm, even, almost lack-lustre demeanor throughout the year. This was the September "Boom" where we did experience wholesale and substantial price advances. All grades of waste-paper, new and old rags, bagging, rope and strings were affected. The high levels held for a month or so easing off gradually in most cases as the year drew to a close. In no grade however were the low prices prevailing in the first eight and one half months seen again. Eliminating News, Mixed and Corrugated, and Roofing, as grades not to be considered purely from a supply and demand angle due to the factors acknowledged to influence their positions with generally complete disregard for the normal price—influencing determinants, we may say that all grades retained a sufficient amount of strength which the boom infused into them, to make substantially better showings at the year-end over pre-conflict 1939.

Hostilities in Europe Increases Demand

The normal, usual factor of widening in the supply --demand ratio was the cause. Consumption, which had been slowly but surely increasing with production and general better consumer operating levels in their own right, received a generous impetus with the outbreak of hostilities. There was the usual amount of speculative covering, but there was a substantial increase in demand for immediate consumption. The continuance of this demand into 1940 is reflected in the virtual continuance of the higher prices which is initially instigated. In short, our Paper, Board and Roofing Mills are still operating at a good pace, consumption of basic materials is correspondingly brisk and prices fairly representative of these conditions, except of course in the case of our four orphans, News, Mixed, Corrugated and Roofing.

Price Trend in Paper Stocks

A few figures for the record. Waste Paper—Mixed at 2.50 on cars or trucks New York, in January moved up to 4.50 in February, wavered at around 3.50 through the summer until early September when it reached 6.50. The conflict in Europe brought it sharply to 11.00 but sloshed back until at the year end it was back to $6. News at $6 and $7 in the early months fluctuated at narrow margins around this figure, September $12.50—year-end $10. Corrugated boxes, at the outset making a poorer showing than News, assumed its normal post at a dollar or so better than it's companion and followed along at this margin for the balance of the year.

Kraft grades, terribly weak in the early months were the strongest of all at the close. This due to the Kraft Pulp Market and the effect of the hostilities on it. Kraft Corrugated at $10 in January, brought better than twice that figure at the year end, moving up slowly through the summer but like all grades, getting its real boost in September. 100 per cent Kraft Papers, free of Corrugated went from $11 to the same figure (about $22 f.o.b. cars New York). And in the same manner, Kraft Corrugated Cuttings from $20 to $31, Kraft Envelope from $30 to $45. Kraft Bag Waste from $28 to about $38.

No. 1. Books—(sort of an orphan too) fluctuated around a $10 f.o.b. New York base price until September when they went as high as $18, slipping back to a $14 average at the close.

White Ledger did not move far from $22 until

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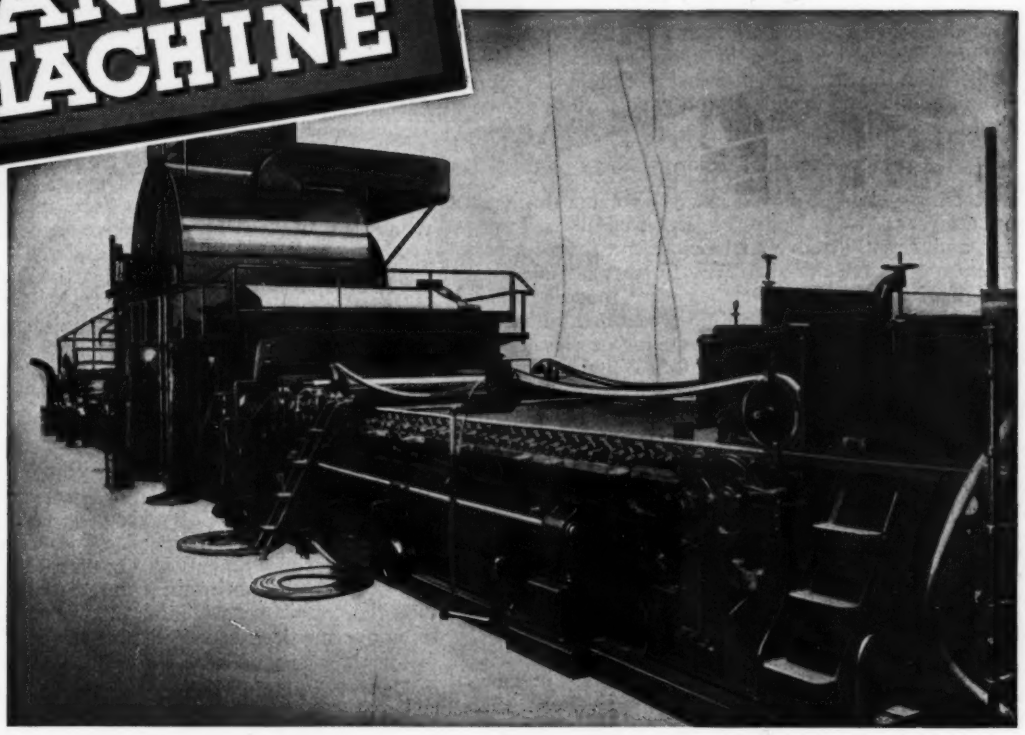

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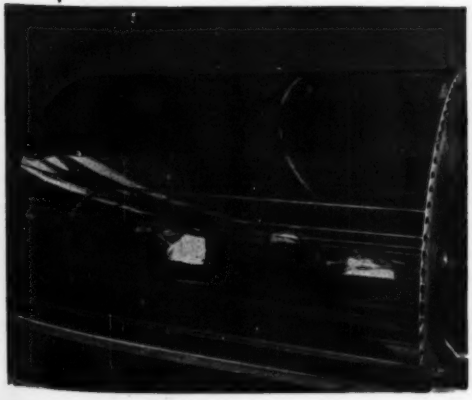

Beloit has developed a special alloy metal and special grinding and polishing process to produce the close grained, hard mirror finish shown in this photograph. This is a result of Beloit's many years of experience in building practically all the Yankee machines in this country.

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September when they went as high as $30 moving up slightly to $31—$32 at the year-end.

The key "high-grades" were fairly firm throughout the year. White News Blanks moved from $26 to $40 in September receding slightly to $36—$37 thereafter. Ordinary Soft White Shavings at about $32 through most of the year, went to $40 in September and closed higher at $43. Hard White Shavings, average quality, ranged from $38—$42 in January up through $52—$55 in September, better qualities bringing $55—$57 at the end. Hard White Envelope Cuttings moved through the year at about $45—$47 until September when best qualities brought as much as $65—higher than the then current bleached Sulphite Market by quite a bit. $60 would get you good packings from then on.

Price Trend of Roofing Rags

Roofing—No. 2's, moved in good volume throughout the year. At $16. delivered Eastern Mills in January and slightly above and below until September when prices were raised to $25. Further advances to a high of $35 in early October were recorded. The grade held fairly firm until the year-end although prices were reduced somewhat as the year closed out. No. 1. maintained a margin of $4-5 over No. 2's throughout the year. Foreign Dark Cottons were never very important, being called on only occasionally for tactical purposes. Volumes were negligible since for the most part foreign shippers' prices left no margin for the importer against prices granted by the mills. Speculative importations proved profitable to those having stocks on hand at the outbreak of the war. Thereafter the grade could only be quoted nominally since exports from countries producing volume of satisfactory quality were prohibited.

Price Changes in Paper Making Rags Small

Paper-making Rags—Notable fluctuations in new cuttings, were practically non-existant. Even the European conflict had little appreciable effect on the price. For instance White Shirts went no higher than 8 cents f.o.b. New York, with a low of 6.75 in March, this represents a range for the year of little scope. From the September high they receded to 7.25 at the end of the year. Export demand was sufficient to keep the grade from sagging in the face of sluggish mill demand, but at no point did it cause a runaway. This see sawing between export and domestic purchases together with the steadily shrinking supplies of good white papermaking cottons kept and will undoubtedly continue to keep the grade at a relatively even keel. Blue Denims' high in September was 5.50 delivered, less mill discounts. The low was 4.75 and at either end of the year 5 cents and 5¼ cents. Unbleached Muslins followed the general trend of skirts, sometimes at even money, sometimes at 25 points less and occasionally as much as ½ cent more,—this in late September when the grade was bringing 8.50 for a brief period. Light flannelettes opened at 4.25—4.50 f.o.b. New York, hit six cents in September and closed at five cents. Best percale prints 3—3.25 to four cents to 3.50 in the same manner.

At no time during the year were paper making grades other than "Shirts" exportable in volume with the exception of a few white and unbleached specialties, neither were any substantial quantities of any grades of New Cotton Cuttings of any description imported. The Markets were just such, here and abroad that freights absorbed the differentials.

Rope and Old Bagging Prices Climb

Miscellaneous Grades—No. 1 Manilla Rope was a fairly interesting grade. January saw domestic at 3 cents, foreign at 2.65 f.o.b. Eastern shipping point and dock respectively. Although little noteworthy fluctuations were seen until the Europeon conflict broke out, prices zoomed thereupon and were constantly raised to bring out needed supplies, closing all even at 4.50, with little foreign available and not enough domestic to make consumers feel comfortable.

Jute strings were in good demand, principally however for shredding. Two cents in January to 3.50 in December with never enough stock to satisfy all.

Foreign Gunny Bagging was practically a stepchild. Needs in the first eight months didn't justify payment of prices asked by foreign shippers and then when demand became active, exportation from producing countries was prohibited. Domestic Gunny therefore shouldered practically the entire burden ranging from 1.75 delivered South in January, down through 1.50 in July, up sharply to 2.25 in September and merrily on to 2.75 in November, where it stayed until year-end. Again the principal consumption was for shredding.

1939 Not a Bad Year

So there is 1939! Not a bad year, commercially, as years have been going lately—perhaps it will be regarded in retrospect as a veritable gem. We hope not. 1940 progresses, or at least its days pass. It has been marking time, poised so to speak, not knowing whether the uncertain future is more desirable than the certain past. For a change, no one is able to, nor seems desirous of steering her course, or predicting how she will travel.

The paper-making industry from the point of view which concerns us here, seems to offer nothing particularly new in the way of things to be worried about, or to be hoped for.

The "Rag Man" may feel slightly apprehensive about diminishing supplies of good paper making grades, free of synthetic fiber blends, or replacements, but then he finds other markets doesn't he? The consumer doesn't worry much because he uses less as the supplies diminish.

The Rag Man may worry a little about raw cotton replacing rags in fine papers, but without subsidy on the part of the Government there seems to be little basis for any alarm, and such a subsidy is manifestly out of order, and we feel, expected by no one as a permanent condition.

The Waste Paper Producer is apparently incapable of ordinary mental processes—so that's easy. No worry there.

Our esteemed customers, collectively nourish the same fleas, as heretofore, but like David Harum's dog, seem to *flourish*—so we pass them by with a friendly scratch behind the ear.

So, friends, it would seem like everything was hunky-dory, wouldn't it! To maintain this illusion stick to the sport page of your daily paper (even the "comics" are pretty tough to take these days) and we'll be around again before you know it—and with a new administration, so help me.

Paper Board Industry Sets Up All-Time High Record of Production in 1939

By Grafton Whiting, National Paperboard Association

The year 1939, particularly the performance during the last quarter, has brought a feeling of satisfaction to all engaged in the paper board industry. During the first half of the year, despite a good volume of output, price levels were low and customers were purchasing for immediate needs, reluctant to make forward commitments. It was not until September, following the start of hostilities in Europe, that buyers realized the low status of their inventories and the fact that business improvement in this country was well under way and that demands for exports to the warring countries were coming on top of rising domestic requirements. Almost overnight the market for Paperboard shifted from buyers to the hands of the sellers; prices no longer were questioned, deliveries were the chief concern. By the close of the year, normal conditions had been re-established, but there still remained a substantial bank of orders to be carried over for fulfillment in 1940.

The paper board industry is included within the general classification of Paper, and below is a statement of the tonnage produced by the several divisions as set forth in the publication of the United States Bureau of the Census for the year 1938:

TABLE I

Divisions	1938	Per cent
Paper board	5,103,767	45
Wrapping	1,865,856	16
Book	1,336,814	12
Newsprint	832,331	7
Building	570,454	5
Tissue	548,943	5
Writing	481,719	4
Other	640,930	6
Total	11,380,814	100

The prominence of paper board is not alone in the tonnage produced, but also in the total value of output.

Over 90 per cent of the paper board tonnage is made by mills that serve fabricators of shipping containers, paper board boxes and specialties. The remaining 10 per cent is composed of such grades as cardboard, binder's board, press board, etc. While these are all properly classed as boards, their use is foreign to that of box-making and they form groups outside of the field covered by the National Paper board Association.

There are 380 multi-cylinder and Fourdrinier machines recognized as producers comprising the paper board industry, located in 228 plants and owned by 143 companies. Some 25 of these are engaged primarily in making other grades, but their equipment is such that paper board can be made at a profit when price levels are favorable.

Subdivisions within the industry are based upon the use to which the material is put, and the two main groups are container boards and box boards. Container boards include the liners or outer facings, the .009 corrugating material or inner fluted members,

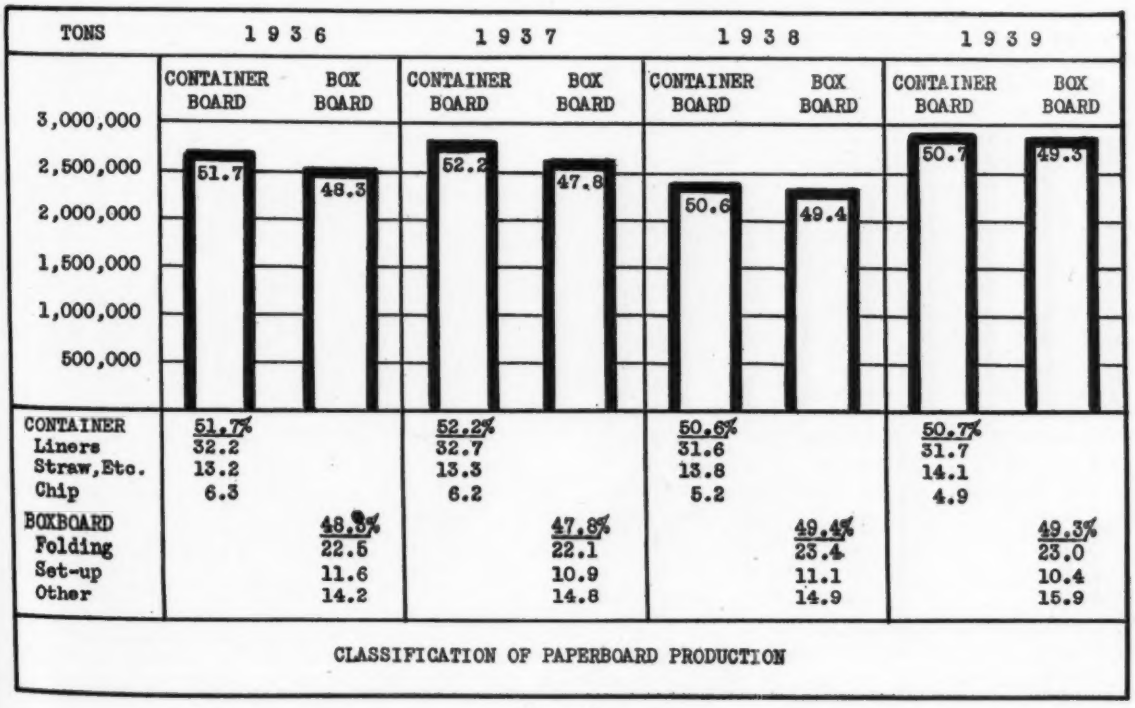


CHART I.

and chip used for certain grades of corrugated board and for the inner plies of solid fiber boards. These, in turn, are manufactured into Corrugated or Solid Fiber shipping containers which are in common use, for shipments by rail, truck, express and parcel post. Boxboard includes a large assortment of grades, colors and finishes suitable for fabricating folding cartons, and also many grades of stiff boards used in the manufacture of set-up or rigid boxes. A third grouping consists of miscellaneous boards used for special purposes not directly connected with boxes.

Chart I shows the relative importance for the past four years of each of the main groups and the several grades of which each is composed.

Raw Materials

The two principal raw materials entering into the production of paperboard are waste papers and pulp. The paper is collected from stores, office buildings and homes; the pulp is produced in domestic mills and imported from Canada and European countries.

Waste Paper

The paper board industry alone consumed over 4,000,000 tons of waste paper stock in 1939 and paid over $35,000,000 to dealers and collectors. The amount of waste paper collected is largely in proportion to the price paid; since with high prices it is possible and profitable to the supplier to ship paper in from outlying sections which otherwise would be unavailable. Likewise, the housewife will save papers in place of destroying them if offered a sufficient price. Seasonal variations occur due to weather conditions, particularly in the winter months. The spring and fall collections are the heaviest. Accepting the fluctuation, it is of interest to see what price will bring out what amount of tonnage. There are two general waste paper markets, the East with New York City as its center; and the West with Chicago as the largest factor. Taking the West as an example, and Mixed paper prices as a key figure, it is found that $4.50 per ton in 1938 brought out an average of 25,000 tons per week; in 1937 $15.00 a ton for Mixed paper was required to obtain 40,000 tons and $6.00 dried up the supply to 30,000 tons. From April to August, 1939, $6.00 failed to bring out the current consumption of 33,000 tons, as evi-

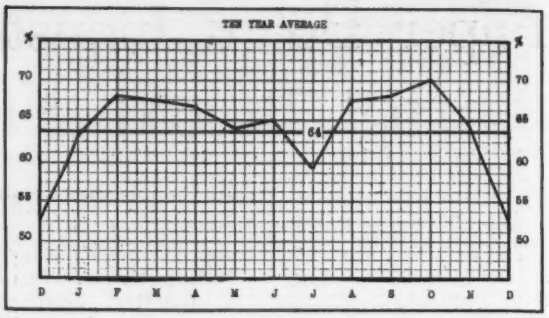


CHART II.

denced by a continuous shrinkage in inventories. In September, $12.50 brought out about 40,000 tons, a better showing than in 1937. The tons obtainable do not progress in direct ratio to the price paid. Added requirements are gained only by substantial advances and the net cost of such extra tonnage may mount to four or five times higher than would otherwise obtain.

If there are excluded the mills using pulp only in their output, there is an average consumption of between 1700 and 1800 pounds of waste paper for each 2000 pounds of paper board output. It is evident that the supply of waste paper is of prime importance to the mills and that whenever board production experienced a sharp increase, there must be expected a rapid advance in waste paper cost.

A further analysis shows that inventories exert a stabilizing influence when building up is done in slack periods and withdrawals are made during peak demand. Wide fluctuations in prices are detrimental to both the waste paper dealers and to the mills, and since it is not possible to predict far in advance the demands upon the mill, it naturally follows that an adequate inventory will help in eliminating drastic and sudden changes between supply and demand.

Wood Pulp

During 1938 the consumption of pulp was 7,545,000 tons, of which 1,710,500 tons, or 22.7 per cent, was imported and 5,834,500 tons, or 77.3 per cent, came from domestic production. (Excludes exports of 140,500 tons.) Of the 1,710,500 tons imported,

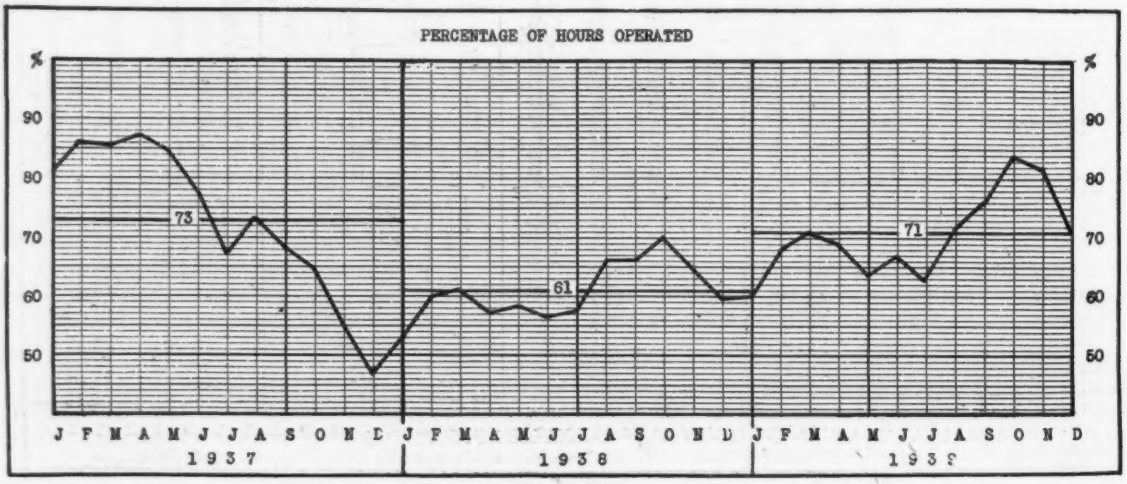


CHART III.

FINNISH CELLULOSE ASSOCIATION

SUOMEN SELLUULOOSAYHDISTYS "FINNCELL" FINSKA CELLULOSAFÖRENINGEN

FINNISH WOODPULP UNION

SUOMEN PUUHIOMOYHDISTYS "FINSKA" FINSKA TRÄSLIPERIFÖRENINGEN

CABLES: FINNPULP
TELEPHONE: MURRAY HILL

PULP SALES CORPORATION

SOLE REPRESENTATIVES IN U.S.A. & MEXICO

230, PARK AVENUE, NEW YORK, N.Y.

Canada sent 467,500 tons, or 27.3 per cent, and Europe 1,243,000 tons, or 72.7 per cent. Finland's proportion of the total imports was 258,900 tons, or 15.1 per cent.

The records for 1939 are not as yet complete, but during the first eleven months, imports amounted to 1,790,900 tons which is 16.8 per cent greater than for the similar period in 1938. Of this total, Canada sent 569,600 tons, or 31.8 per cent, and 1,221,300 tons, or 68.2 per cent, came from Europe. Finland's share was 289,900 tons, or 16.2 per cent.

Pulp Users Concerned

The conflict in Europe has caused much concern to pulp users in this country, lest the foreign supply should be seriously interrupted. This is particularly true with respect to Finland and its 15 to 16 per cent contribution. During the last world conflict pulp continued to be imported with but little interference except for irregularity in receipts. This is equally true since September of last year when decreases in one month were made up by increases in the following periods. The eleven months' increase in imports from Europe was 11 per cent over the same months in 1938 which is not a bad showing since the sharp increase in consumption demand did not come until September. Canada was able to step up its supply during the eleven months by 31 per cent and all domestic mills have experienced a satisfactory demand with operations close to capacity during the last four months of the year. The fear expressed last year that the large increase in pulp capacity built during the past two years would be a drag upon the market for some time does not exist at the moment. In fact, it is fortunate at this time that these plants are now ready to meet the increased demands.

Pulp prices have had a sharp upward turn as will be seen by comparison between the pulp prices per ton, on dock, Atlantic seaboard, published by the Official Board Market for January, 1939 and January, 1940.

Grades	1939	1940
Sulphite Foreign Bleached	$45.00 to $50.00	$65.00 to $75.00
Sulphite Foreign Easy Bleach	37.00 to 42.00	55.00 to 58.00
Sulphite Foreign Unbleached	37.00 to 42.00	52.00 to 55.00
Sulphate Foreign Kraft	30.00 to 33.00	50.00 to 55.00
Sulphite Dom. and Canada Bleached	50.00	65.00
Sulphite Dom. and Canada Unbleached (Del.)	40.00 to 43.00	55.00
Sulphate Dom. and Canada Kraft (Del.)	33.00 to 35.00	50.00 to 55.00
Ground wood Dom. and Canada (Del.)	26.00 to 28.00	39.00 to 41.00

Due to conditions in Europe there is included a charge of $6.00 to $8.00 for increased transportation costs and of 2½ or 3 per cent for war risk. Many foreign mills also exercise war clause in contracts which permits additional charge for increased manufacturing costs. This charge has ranged from $4.00 to $5.00 per ton.

The European countries and Canada, as well, are favored further by the rate of exchange now existing between the dollar and monetary units in other countries.

The low point for pulp receipts from Europe comes in March and April conforming to weather conditions and it seems reasonable to assume that the December and January shipments will not be seriously curtailed. Fortunately, the inventories of pulp on hand at the mills are at least average, and with a lesser consumption in prospect than during the latter part of 1939, it will be well into the second quarter of this year before any shortage develops.

Seasonal Variations

The flow of paper board demand varies during the year in response to seasonal requirements of the fabricators of shipping containers and cartons. It is found that the average year has an upturn late in the first quarter which reflects requirement for the Spring flow of business and again in the preparation for the Fall business and Christmas trade. Chart II illustrates these changes and gives the activity for each month contrasted with the yearly average of 64 per cent. No one year will exactly follow the pattern which was developed by consolidating ten years of records.

The pattern of activity in 1939 followed, in the main, that of the seasonal trend until the outbreak

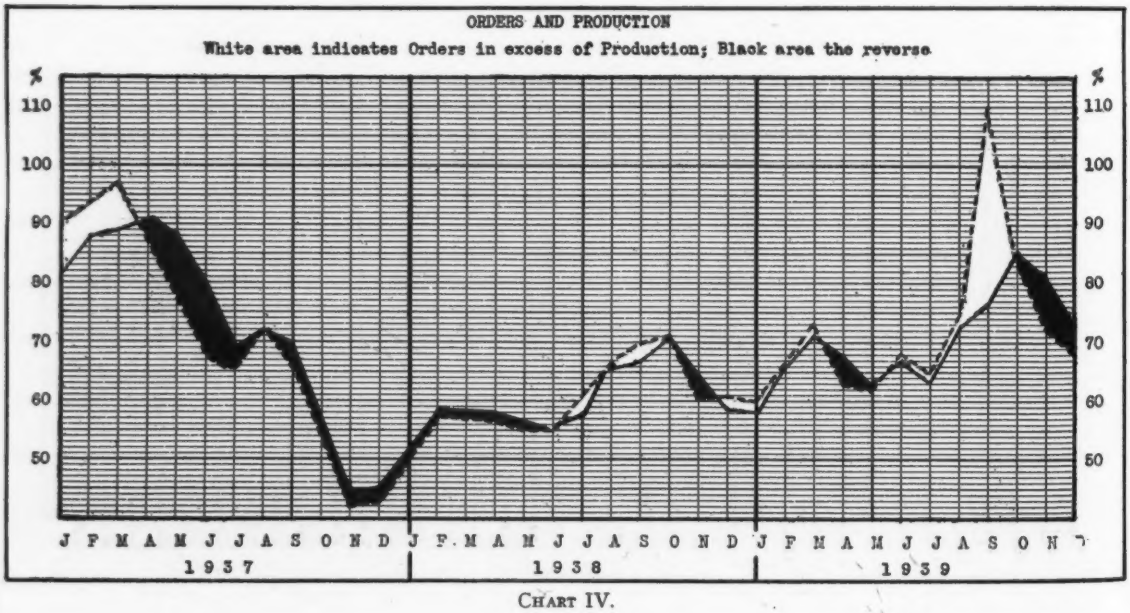

ORDERS AND PRODUCTION
White area indicates Orders in excess of Production; Black area the reverse
%
110
100
90
80
70
60
50
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1937
1938
1939

CHART IV.

of hostilities caused the rapid increase in activity during the last four months. It was evident, had this not occurred, that the year's pattern would have been close to normal. The value of this seasonal variation chart lies in the ability to compare a year's performance with the average expectancy and to measure the degree to which changes in demand varied the flow of output from its normal course.

Paper Board Mill Activity

The term "Paper Board Mill Activity" is an expression in percentage of the operating time. A work-week of 144 hours (6 days) is considered 100 per cent and the hours of actual operation during the week as reported, divided by 144, gives the per cent of activity.

Chart III is drawn to show the relative activity for each month during the past three years and also the average activity for the year as a whole. In 1937 the activity was 73 per cent and the tons produced, 5,510,000, or an average of 75,480 tons for each point. In 1938, with 61 per cent and 4,896,100 tons, the rate was 80,260 tons, and in 1939, with 71 per cent and 5,910,000 tons (estimated) the rate was 83,240 tons per point. This comparison illustrates the degree to which the introduction of new and faster running machines and the improvement in existing equipment has enabled the industry to produce a greater tonnage each year in a gi-en length of time.

It will be seen that the first half of 1937 was more active than the second half and that the year following was of lesser total output. Conversely, 1938 had greater activity in the second half and in 1939 a larger volume was produced. Reference to former years shows that strong second half year activity forecasts a larger volume in the following year. If 1940 runs true to form, it should surpass 1939 and establish a new peak volume for the industry.

In some industries it is the practice to state activity as a per cent of capacity rather than on a time basis. If the highest week's production for each mill is considered its capacity, and if allowance is made for all machines capable of being operated but now held in reserve, the total capacity for the paper board industry is found to be 8,250,000 tons. Considering 5,910,000 tons as the 1939 production, the activity would be 71 per cent of capacity, or the equivalent of 4.9 days' work in each 7 day week for each machine.

Orders and Production

Incoming orders are contrasted with production in Chart IV by reducing each to a percentage figure with 100 per cent equal to six day production. To distinguish between periods in which orders exceed production, the intervening space is left white, while production when in excess of orders is emphasized by the black area. 1937 opened with incoming orders well in excess of production, culminating with a peak in March. Following this, the reverse condition prevailed, with the black area continuing until June of 1938. Alternating white and black areas, indicating demand and supply in fair adjustment, marked the ensuing period until September, 1939, when the inrush of orders exceeded the previous high in 1937. The significance of this display lies in the fact that following each rapid increase in orders, a reaction takes place with production greater than incoming orders and a decrease in the high levels obtained. The adjustment at the close of 1939 is shown well under way and has continued during the first part of 1940. However, the level of production conforms with general business requirements and this year conditions are quite different from those which existed in the prior years shown on the chart.

Days to Run

The "Days to Run" is an expression used to designate the volume of unfilled orders in terms of the time necessary for their completion. Chart V gives the average days to run for each month during the past three years. In April, 1937, the bank of orders reached 15 days and from then until the close of the year, a decrease took place each month. During 1938 and up to August, 1939, the average was 4.5 days and the rapidity of the inflow of orders in September

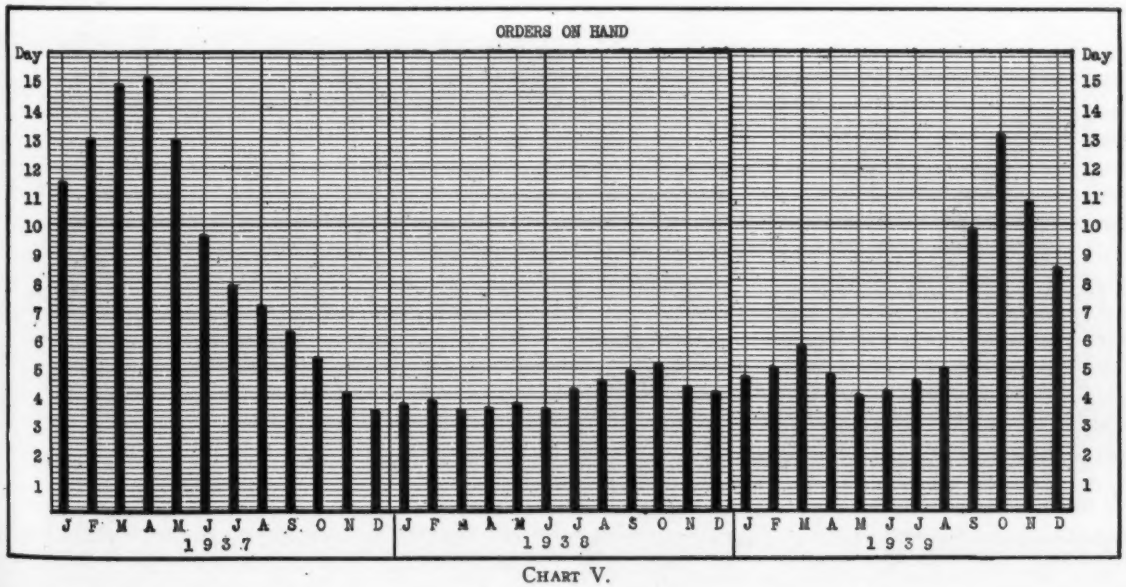


CHART V.

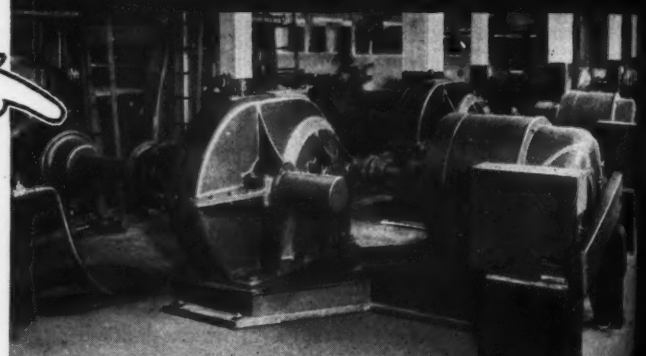
They

G-E DEVELOPMENTS FOR THE PAPER INDUSTRY

1. Supercalender drives of unusual size
2. Record-size grinder motors
3. Turbines with wide-range electric governors
4. Progressive draw adjustment
5. Variable-voltage winder drives
6. Sectional paper-machine drives
7. Drive to maintain constant transfer-belt tension

SECTIONAL PAPER MACHINE DRIVE

D-c Job



Making kraft 234 in. wide in a Florida mill

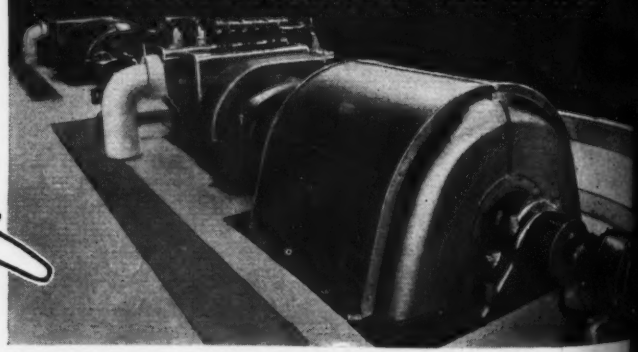
SPLASHPROOF CONVEYOR DRIVE

A-c Job

Gear-motor starts logs along at a kraft mill in Georgia

TURBINE-GENERATORS FOR POWER

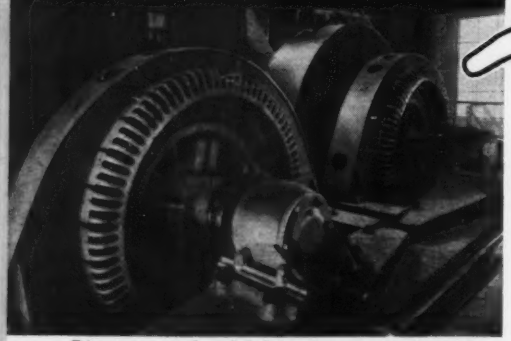
A-c Job



More electric power per pound of fuel is the consistent record in turbine-generator progress. Power room of a Florida kraft mill pictured

SYNCHRONOUS MOTORS FOR CHIPPERS

A-c Job



Direct-connected and helping boost power-factor in Georgia pulp mill

Put a *Wallop* *with Precision* into Papermaking

G-E equipments assure flexible ranges of speed, high speed, and exact control of complex processes

HERE are representative G-E electric equipments that assure both *wallop* and hair-line *precision* in the drive and control jobs of high-speed and fine papermaking. Two thousand fpm machines must have a drive with plenty of punch and flexibility—so must modern machines that operate at lower speeds. Differences in load characteristics introduce knotty problems in synchronizing the entire machine.

General Electric provides equipments—electric "systems"—that successfully answer these and all the other problems to which electricity can be summoned—for all kinds of paper machines ranging from thickest board to thinnest tissue. You'll find G-E drives on the highest-speed machines—in the first cigarette paper mill in the United States—in the largest Northern newsprint mills, and in the first Southern newsprint mill. Developed in co-operation with mill and machinery manufacturers, General Electric equipments have been prominent in making possible *more* paper and *better* paper. General Electric Co., Schenectady, N. Y.

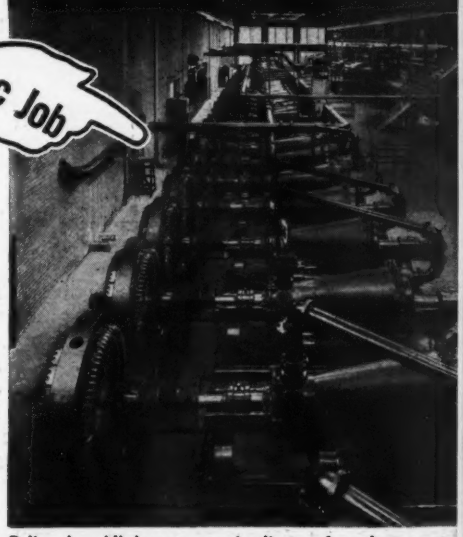
CONSTANT-TENSION WINDER CONTROL

D-c Job

Operator's station for control of high-speed adjustable-voltage winder. In a new Southern paper mill

RECORD ROW OF JORDAN DRIVES

A-c Job



Believed world's largest operating lineup of synchronous motors—a Georgia mill

HIGH-SPEED SUPERCALENDER DRIVE

D-c Job

Adjustable-speed motor drives "super" in Midwestern coated-paper mill

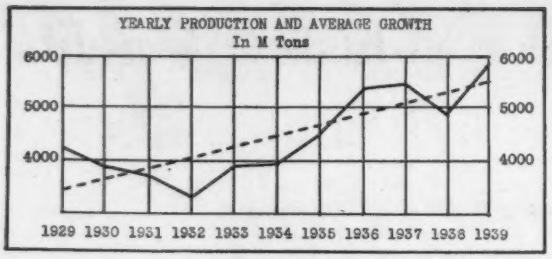


CHART VI.

can be judged by the increase from 5 days to nearly 10 days in a four week period. The peak in October, 1939, shown at 13 days, did not reach as high as in 1937 and was more quickly reduced. The average mill can operate more economically with an adequate bank of orders which permits the production schedules to include a sufficient tonnage of like grades to be run and thus avoids the loss incident to many changes on the machine. On the other hand, too large a bank of orders is detrimental, since it necessitates a delay in deliveries and a failure of prompt service to customers.

Production

A census of the industry is taken each year which includes all mills known to have produced paper board. The totals for the past ten years are as follows:

Year	Tonnage	Year	Tonnage
1930	3,924,100	1935	4,516,000
1931	3,768,800	1936	5,290,600
1932	3,289,000	1937	5,510,000
1933	3,904,200	1938	4,896,100
1934	3,928,300	1939	5,910,000 (Estimate)

As yet the final figures for 1939 are not available, but from records covering over 93 per cent of the Industry, an estimate of 5,910,000 tons has been made—a new all-time high. This is 20.7 per cent above the 4,896,100 tons made in 1938 and 7.2 per cent above the 5,510,000 tons in 1937. Boxboard gained 20.4 per cent or 495,000 tons, and container boards gained 20.9 per cent or 519,000 tons over 1938. In the container grades, kraft boards made the greater increase; and, because of their light weight per square foot (the measuring stick from the standpoint of usage) increased more than indicated by the 20.9 per cent based upon the weight.

Paper board is one of the oldest branches of the Paper Industry, yet it has a surprising vigor in its ability to grow. From 1929 to 1939 there has been an average yearly gain of 4½ per cent or over 200,000 tons. Here again, the Container grades have shown the greater advance with 5.3 per cent or 120,000 tons increase, whereas Boxboards improved 3.7 per cent or 80,000 tons. These gains have been due to the joint efforts of the mills and their customers in developing new products and in extending the uses to which the standard grades are put.

Chart VI shows the output in tons each year (the solid line). The average increase (the broken line) indicates the growth factor.

Each year new machines are brought into operation and a few of the older ones are closed down, but these changes do not form a measurement of the increase in capacity. The continued improvement in the existing equipment is a big factor. During 1937 and 1938 the mills, on the average, were able to make some profit and considerable amount of this was plowed back into the plants to reduce costs of operating, to improve the quality of production and to increase efficiency. This was effective in 1939, and 1940 will benefit by these changes, together with those completed in 1939. Competition exerts constant pressure on each mill to strive for cost reduction, better output and improved service to customers.

Price Levels and Costs

The prices of all grades of board were higher in January this year than at the opening of 1939 as shown by the list below taken from the Official Board Market.

Grades	January 1939	January 1940
Chip Board	$27.50 — 32.50	$40.00 — 42.50
Single Manila Lined Chip	45.00	55.00
White Patent Coated News	57.50	67.50
Corrugating Material	0.52 — 0.55*	0.69 — 0.72*
Test Liners	1.00*	1.29 — 1.30*
Newsboard	37.50	47.50

* Prices are stated per ton except for Corrugating Material and Test Liners which are per M sq. ft.

The increase in prices last year did not take place until September when the demands upon the mills caused the sharp upturn in production and consequent rise in waste paper prices as already noted. In addition to this, the cost of pulp to the mills advanced and many items entering into board costs, mill supplies and expense increased. It was difficult to reflect at once in selling prices these sudden advances in costs since outstanding contracts had to be fulfilled and quotations previously made had to be given some consideration. The advances in board prices were fully justified by reason of rising costs.

The paper board outlook for 1940 is much the same as that for general business since the industry's output enters into the packaging and shipping of such a large range of commodities. Most economists agree that this year should show improvement over 1939 and, as previously stated, 1939 experienced a heavy fall volume which predicts for paperboard a better year to follow if history repeats itself.

The separation of a forecast into quarter or even by half year periods presents a number of complications—the duration and severity of hostilities abroad, the political situation in this country, and whether or not the improvement in business experienced in 1939 will continue throughout 1940. The first quarter with its bank of orders carried over from 1939 should show a satisfactory output with the seasonal upturn in its favor during February and March. The second quarter should be somewhat lower in volume, with the third and fourth quarters making good gains each month, with October a peak, followed by the usual year end decline. There is no indication that the cost of raw materials will be reduced in the immediate future and board prices should remain close to the present levels.

The industry is in a favorable position for 1940. The mills, for the most part, are in excellent condition. There is ample capacity to take care of any demands and reserve machinery is held in readiness awaiting only confidence that enough volume is in view to warrant operation.

The annual growth is another favorable factor and the development of new uses for the industry's product is the subject of constant research.

There seems to be more confidence in the future than has prevailed in the past few years, and if business responds to this sentiment, the paperboard industry will reach new highs in 1940.

Canadian Pulp and Paper Industry Benefits By Increased Output and Shipments

By C. L. Sibley, Regular Correspondent of the Paper Trade Journal

Of the newsprint industry in Canada it can be said that it has started the year 1940 in the full tide of one of those swings that alternately have brought it blessings and curses. This time the blessings are in evidence. Moderate and steady progress in recovery, due to the improvement in general business, was in evidence prior to the outbreak of hostilities, but since the conflict there has been a sharp increase in production and shipments, with every evidence that as long as the European conflict continues shipments will compare favorably with the highest in the history of the industry. Financially, too, the companies are in better shape than they have been for years. Most of them have already paid off their indebtedness to the banks, which not so very long ago ran into high figures, and although they have not yet begun to give any return on the drastically-reduced capitalization effected during the general reorganization of the industry, the prospect of a return to a dividend-paying basis is not now regarded as remote.

Hostilities in Europe Create Uncertainties Here

One over-riding factor ever present in the minds of the manufacturers is that phrase "as long as hostilities continue." Its effect is seen both in current policy as regards price and in prospective policy as regards capital investment. There is not the slightest disposition to mistake present abnormal conditions as any basis for speculative expansion. While Canada has a potential newsprint capacity capable of taking care of 30 per cent more production than is called for even under present conditions, much of this unused capacity would require substantial expenditures in renovation and improvements to bring it into remunerative production, and such expenditures will be very carefully scrutinized before they are made to care for what may be only a temporary increase in demand that would end suddenly whenever the war came to a close. As far as new newsprint mills is concerned, the subject is taboo in newsprint circles and moreover is frowned upon by the provincial governments, who hold the whip hand since in their possession are the Crown lands cutting rights over which are essential to any new enterprise.

Increasing Interest in Products Other Than Newsprint

Another consideration is that newsprint production is no longer regarded as the most profitable method of exploiting the forest resources of the Dominion, and newsprint firms are regarding with interest other channels of production that in the long view offer more profitable opportunities. An indication of this was contained in the address of the retiring president of the Canadian Pulp and Paper Association at the recent annual convention of that body when, in a markedly optimistic pronouncement regarding the outlook of the pulp and paper industry, he pointed out that of the 4,300,000 tons of pulp and paper products shipped from the Canadian mills in 1939 only 2,900,000 tons were in the form of newsprint, while 1,400,000 tons were in the form of other products, comprising a vast variety of the articles other than paper for the manufacture of which there is a demand for groundwood and chemical pulp. Board products alone he was certain, he said, would reach a production of 1,000,000 tons per annum within the next two decades, and in other directions the possibilities were such as to make it rash even to give a rough estimate, for science was every day bringing into commercial use new products manufactured from pulp.

Manufacturers in Firm Control of Industry

One marked difference now in the newsprint situation as compared with that in any of the previous "swings" is that for the first time the newsprint operators are so firmly in control of the situation that there is little prospect of "runaway" conditions developing, either in regard to supply or price. Never before has there been such a marked degree of co-operation among the newsprint manufacturers as now exists. Evidence of this was forthcoming immediately after the outbreak of war, and it is forthcoming now in even greater measure. In the first week of September last they got together in a special meeting and decided to use their utmost efforts to stabilize conditions, both by ensuring a continuous supply of newsprint and by ensuring non-profiteering prices. In a statement issued on their behalf, Charles Vining, president of the Newsprint Association of Canada, said:

"The manufacturers realize their duty and responsibility in supplying a commodity of vital wartime importance in the dissemination of news and public information, and they wish to give assurance that this realization will guide their conduct. They pledge themselves to assist, by any means within their power, the war effort of the nation. The Canadian newsprint manufacturers will meet the wishes of their government by avoiding any attempt to profiteer and will make every effort to maintain stabilized conditions of continuous supply and to discourage methods of buying and selling which might cause a disorderly market. With these purposes in mind, the Canadian manufacturers strongly urge their customers to take their shipments as far as possible in equal monthly quantities. If normal contract methods of buying are followed, the Canadian mills believe they are in position to assure continuous adequate supply to all customers depending on them."

Production and Marketing Orderly

These pledges the manufacturers have observed to the letter, with the result that production and marketing have proceeded in an orderly manner, while prices have remained on the $50 basis that prevailed prior to the war. The fact that the leading com-

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panies have now announced the maintenance of the $50 basis for the first half of the present year is further evidence of their desire to maintain an orderly newsprint market. That there has been increases in costs in many directions is inevitable, but this so far has been covered by the fact that while the American publisher pays the same number of American dollars per ton as he did before the war, the Canadian manufacturer receives 10% more in Canadian dollars, because of the discount on Canadian funds. After allowing for increased costs of materials, labor and shipping, the margin left on the premium on American funds when exchanged into Canadian dollars is sufficient, combined with the greater economy implied in larger production, to bring the manufacture of newsprint back to a remunerative basis.

Productive Capacity of Newsprint Mills

The productive capacity of Canadian newsprint mills in 1939 was 4,293,361 tons per annum, an increase of 89,000 tons as compared with the productive capacity in 1938, and of 410,361 tons as compared with the capacity in 1937, in which latter year production reached an all-time high record. The actual production in 1939 was 2,861,202 tons, and the shipments reached practically the same total. From these figures it will be seen that Canada could produce 1,432,159 more tons per annum at capacity production than was produced in 1939. Normally the United States imports from Scandinavian countries are from 250,000 to 300,000 tons per annum. If these supplies were entirely cut off Canada could supply the deficiency and still have a surplus capacity of a million tons per annum. In fact, Canada could easily take care of the whole of the normal newsprint export trade of Finland, Sweden, Norway and Germany, amounting to some 950,000 tons per annum, and still have a substantial surplus capacity.

Now let us see how the demand on Canadian mills has actually been affected since the outbreak of hostilities in Europe. Since this began production has been around 75 per cent of capacity, as against around 65 per cent prior to the conflict. During the whole of the first quarter of the year production was on a lower basis than in 1938. Then there came an improvement in general business which reacted favorably on newsprint consumption. For the final four months of the year—that it, the war months— production averaged 3,435 tons per month more than in the corresponding period of 1938. If this average holds in the present year, then Canada will be called upon to produce 27,480 tons more than in 1939, or a total of 2,888,682 tons, as compared with 3,647,800 tons which she produced in 1937, when her capacity was less by 410,361 tons than it is today. It should be explained that this estimate is based on the production of the last four months of the year being considered as the average wartime demand, with the presumption that the production in the last four months of this year will be on the same level as the production in the last four months of 1939, with the increased demand applying therefore only to the first eight months of 1940. Another factor, however, has to be taken into consideration, and that is the prospects on increased consumption, owing to the increasing tempo of wartime business on this continent and its effect on the whole business situation, including the newspaper business. It is thought that there will be a gradual and progressive increase in the demand for newsprint, altogether apart from the effect of the increasing interference with the shipment of Scandinavian supplies, but it will be seen that even if this occurs Canada could easily take care of all demands that might arise, and that therefore there is no possibility whatever of a shortage of newsprint occurring.

New Ventures in Newsprint Discouraged

In view of the very large excess of capacity as compared with production, the Provincial Government of Quebec has resolutely discouraged the exploitation of the pulpwood reserves of the province through the establishments of any new newsprint mills. The big new mill at Comeau Bay, which came into full production last year, was under construction before this policy came into effect, but no permits have been granted since. There has been a change of governments in the past year, but there is no reason to doubt that the same policy will be continued. A similar policy prevails in Ontario and was reaffirmed no later than last month by the Minister of Lands and Forests for that province. The situation, of course, is different in respect to sulphite pulp mills, and new developments in respect to these may be expected if the demands continue to increase as they have of late.

It should not be overlooked that Newfoundland comes into the picture in respect to the North American newsprint market. In normal times about two-thirds of the products of Newfoundland's newsprint mills is shipped overseas, mainly to Great Britain. Since the outbreak of hostilities there has been a marked decrease in the shipments overseas and a corresponding increase in the shipments to the United States. The Newfoundland mills have a capacity of at least 350,000 tons of neswprint per annum, and, compared with pre-war shipments, something like 10,000 tons per month are now being diverted from the overseas market to the United States markets. Largely owing to the change this effected in the last three months of 1939, shipments to the United States for 1939 amounted to 100,333 tons, as against 59,283 tons in 1938, while shipments overseas dropped from 204,450 tons in 1938 to 177,441 tons in 1939.

Canadian Operating Ratios

The production of Canadian newsprint mills in percentage of capacity in 1939 average 66.8 per cent, as compared with 62.4 per cent in 1938, and 93.9 per cent in 1937. The following table gives the monthly ratios for the three years:

Annual Capacity		
Tons, 1939 4,293,361	Tons, 1938 4,204,200	Tons, 1937 3,883,000

Monthly Production, Percentage of Capacity

	1939	1938	1937
January	59.8	65.4	92.2
February	60.0	62.0	91.7
March	58.6	61.0	89.1
April	63.4	56.8	90.8
May	66.4	58.7	95.1
June	66.4	57.0	95.5
July	65.3	59.6	96.8
August	63.0	60.0	97.9
September	72.7	68.2	99.4
October	77.5	72.0	96.6
November	79.7	69.3	92.7
December	69.1	59.3	89.8
Year	66.8	62.4	93.9

Value of Newsprint Exports

The value of Canada's newsprint exports month by month during 1939, as compared with 1938, was as follows:

	1939	1938
January	$ 8,290,258	$ 6,816,828
February	6,533,514	5,964,499
March	9,388,061	8,685,337
April	6,955,061	7,979,896
May	10,677,981	9,135,364
June	10,681,411	8,441,719
July	8,586,411	8,723,502
August	10,194,899	9,621,715
September	9,872,464	8,523,555
October	12,028,263	10,834,212
November	11,232,352	10,838,543
December	11,245,295	9,049,872
Total	$115,685,970	$104,615,042

Shipments and Destinations

The following tables, supplied by the Newsprint Association of Canada, gives the comparative figures as to shipments (in tons) and destination of newsprint from Canadian mills during the past five years:

TO UNITED STATES

1939	1938	1937	1936	1935
160,657	124,439	196,513	139,010	124,305
140,106	115,385	189,876	162,282	117,304
155,642	133,933	232,240	190,662	143,638
177,328	157,824	253,666	201,155	169,621
201,503	149,642	232,128	206,314	176,149
173,760	141,055	236,888	187,577	165,998
158,770	145,318	235,138	194,623	151,471
168,645	162,149	245,050	195,526	153,874
213,219	171,756	240,820	206,193	169,515
220,595	198,889	279,319	228,203	194,899
220,469	203,646	273,985	234,984	209,020
203,432	176,984	293,737	288,056	232,802
2,194,126	1,881,020	2,909,360	2,434,585	2,008,596

12 Months Totals—1939: 2,194,126 1938: 1,881,020

TO OVERSEAS

1939	1938	1937	1936	1935
26,330	34,595	41,971	38,406	36,025
24,548	38,068	28,387	41,034	35,390
33,465	36,468	37,088	41,261	33,991
20,556	43,052	38,242	38,078	33,105
57,698	28,639	53,499	54,159	44,040
42,346	52,257	51,085	44,404	47,529
47,677	47,260	40,774	51,882	45,267
41,309	29,654	66,521	70,858	49,045
37,343	45,617	42,366	47,843	42,985
49,963	42,058	39,900	70,763	59,891
51,743	44,818	61,878	56,233	56,690
44,616	33,293	24,045	64,208	42,616
477,594	475,779	525,756	619,129	526,574

12 Months Totals—1939: 477,594 1938: 475,779

TO CANADA

	1939	1938	1937	1936	1935
Jan.	14,865	9,926	15,331	13,872	14,191
Feb.	13,582	9,453	14,965	13,129	13,823
March	15,992	12,286	20,384	14,614	18,966
Apr.	16,371	13,306	16,542	15,983	16,805
May	15,434	15,007	18,637	17,207	17,017
June	16,155	15,164	15,659	16,359	15,628
July	15,296	12,912	17,759	15,391	17,919
Aug.	14,413	12,865	14,651	15,027	14,806
Sept.	16,443	12,973	17,629	14,147	14,987
Oct.	18,702	14,153	18,996	17,314	18,034
Nov.	15,657	15,957	21,377	19,785	17,968
Dec.	16,572	15,195	27,623	21,412	19,545
TOTAL	189,482	159,197	219,553	194,240	199,689

12 Months Totals—1939: 189,482 1938: 159,197

The Wood Pulp Industry

While the manufacture of wood pulp in Canada is an important industry, its place in export trade is relatively small compared with newsprint. The vast bulk of the pulp manufactured in this country is used in the production of newsprint and in the manufacture of domestic requirements. The increasing use of wood pulp, however, in a wide variety of manufactures, has greatly enlarged the prospects for this industry, and this has been particularly emphasized by war conditions, which have affected this industry far more dramatically than it has affected the newsprint industry. Conditions now are such that there seems every possibility of the pulp industry assuming boom proportions. Canada has been exporting (mainly to the United States) around $30,000,000 worth of pulp per annum. With the cutting off of supplies from Europe, increasing demand has come from that country for Canadian supplies, and in particular for chemical pulp, the price for which has advanced by $10 per ton over that which prevailed last year. Quite a few of the newsprint and other paper companies manufacture surplus pulp for sale, and the prospects are that they will expand this part of their business, with consequent enlargement of their earning capacity. The manner in which the conflict in Europe has affected the exporting of surplus pulp by Canada is shown by the following figures giving comparisons of exports month by month with those of 1938.

Value of Wood Pulp Exports

	1939	1938
January	$ 2,227,779	$ 2,149,823
February	1,781,886	2,390,320
March	2,513,609	2,899,451
April	2,028,987	1,813,017
May	2,459,214	2,469,838
June	1,925,282	1,672,126
July	2,297,450	1,867,581
August	2,937,169	2,833,241
September	2,200,372	2,304,564
October	3,260,926	2,502,430
November	3,435,729	2,493,187
December	3,932,199	2,335,160
Total	$31,000,602	$27,730,738

The Industry's Motive Power

From the very first the development of the pulp and paper industry has been absolutely dependent upon the development of hydro-electric power, and to a very large extent most of the major power developments in Canada have either been carried out directly by pulp and paper companies or in conjunction with them. Of late years mining has been absorbing increasing quantities of hydro-electric power, but the pulp and paper industry remains by far the largest consumer. During the past year production of electric energy has established all-time records, each month showing an increase over the corresponding month of 1938, and the year for the whole showing an aggregate increase of somewhat more than nine per cent. To date increased demand due to war activities has not been experienced to any material extent, but such activities undoubtedly will lead to substantially increasing loads.

New Water Power Installations in 1939

New water power installations in 1939 aggregated 97,040 h.p., as compared with 136,857 h.p. in 1938, bringing the total for the Dominion at the end of the year to 8,289,212 h.p. The greater part of the increase was in the province of Quebec, the remainder being mostly in Ontario and Saskatchewan. The largest development in Quebec was that carried out at Beauharnois, on the St. Lawrence river just west of Montreal, where the ninth unit of 53,000 h.p. was brought into operation, and where work was resumed on the installation of the tenth and eleventh units of the same capacity. On the St. Maurice river the Brown Corporation, through a subsidiary company which it controls jointly with the Shawinigan Water and Power Company, made notable progress on the big development it is carrying out at La Tuque Falls, where its pulp mill is situated. There the installation of the first hydraulic turbine has been started, and it is expected that the first unit of 40,500 h.p. will be ready for operation in August of this year, and that the second, third and fourth units, which will complete the initial installation of 162,000 h.p., will be ready for service in December next.

Such new developments as have occurred in Ontario have mostly been in connection with mining, but it is to be noted that at Black River Falls the Ontario Paper Company completed a hydro-electric plant of 1,500 h.p. to serve its pulpwood barking mill

at Heron Bay. Another new development noted in the year's returns is a 1,400 h.p. plant by the Dryden Paper Company on the Eagle River, though this was really completed in 1937.

In Saskatchewan the principal developments were on the Churchill River, where the Churchill River Power Company completed the addition of a fifth unit of 19,000 h.p. and did other work which brought the total capacity of the plant up to 87,500 h.p.

Power Developments in British Columbia

Although there were no important additions to power in British Columbia, work proceeded on a number of developments, the most important being an extension of the West Kootenay Power and Light Company's plant at Upper Bonnington, where two new turbins of 25,000 h.p. each are being installed. The work is expected to be completed in the spring of this year.

To augment the water supply available for the two generating stations of the Minas Basin Pulp and Paper Company on the St. Croix River, in Nova Scotia, the provincial Power Commission constructed works on the St. Margaret's Bay Lake which will enable the diversion into Ponhook Lake on the St. Croix River of the run-off from 19 square miles of drainage area, normally tributary to the Ingram River. A development on Paradise Brook by the Annapolis Basin Pulp and Power Company, which has been under construction in small stages since 1935, remained inactive during 1939.

Importance of the Industry to Canada

The manufacture of pulp and paper has been consistently one of the most important industries in Canada during the last two decades. It ranks first with respect to wage and salary distribution, capital investment and net value of production. It was first in gross value of production until 1935, when it was overtaken by the non-ferrous metal smelting and refining group. However, its importance is even greater than these comparisons indicate, for in the figures establishing them no allowance is made for the capital invested, the men employed, the wages paid, or the products of the operations in the woods which form such an important part of the industry as a whole. The latest year for which complete statistics are available is 1938. Figures for that year, when there was an all-round falling off in demand, show that if operations in the woods are taken into consideration, the total value to Canada of the industry as a whole amounted to $193,022,601, as compared with $229,789,483 in 1937. This, however, makes no allowance for pulp used in Canada for purposes other than the manufacture of paper, such as the manufacture of artificial silk, fibreware, etc.

Nearly 75 Per Cent of Mills Manufacture Pulp

At the start of 1939 there were 99 pulp and paper mills in operation in Canada. Of these mills 75 manufacturing pulp in 1938 produced 3,667,789 tons, valued at $87,897,148, as compared with 5,141,504 tons in the previous year with a value of $116,729,228. Of the 1938 total, 2,956,028 tons with a value of $56,096,765 was produced by combined pulp and paper mills for their own use in paper-making. The 72 mills making paper in 1938 produced 3,249,358 tons of paper and other products, valued at $151,650,065, as compared with 4,345,361 tons with a value of $175,885,423 in the previous year. Newsprint paper made up 82.1 per cent of the total reported tonnage of paper manufactured in 1938. Newsprint produced amounted to 2,668,913 tons, with a value of $107,051,202, as compared with 3,673,886 tons valued at $126,424,303 in the previous year, when there was an all-time record in the production of newsprint in this country. According to the News Print Service Bureau, the Canadian production of standard newsprint was over three times that of the United States in 1938, and formed 70.7 per cent of the total North American production of 3,713,039 tons. The world production of newsprint in 1938 was estimated at about 7,510,000 tons, to which Canada contributed over one-third, or 34.9 per cent, and produced almost three times as much as her nearest competitor, Great Britain, which contributed 12.7 per cent of the total.

Capital Invested in 1938 Totaled $594,908,222

The total capital invested in the manufacturing part of the pulp and paper industry in Canada in 1938 was $594,908,222, as compared with $570,352,287 in 1937, this including only capital invested in operating mills. The total employment on salaries and wages in that year was 30,493, and the total payroll was $42,619,311, as compared with 33,205 in the previous year with salaries and wages amounting to $48,757,795.

Since 1937 Canada's exports of newsprint have surpassed those of wheat, which was formerly the leading commodity exported, and for a number of years Canadian newsprint exports have been greater than those of the rest of the world combined. The place of the pulp and paper industry in the export trade of Canada may be judged by the following. In 1938 non-ferrous metals and their products took first place with an excess of exports over imports of $217,120,485; wood, wood products and paper were second with $179,469,860; animals and animal products third with $92,908,881; agricultural and vegetable products fourth with $65,775,216.

Dr. R. H. Coats, the Dominion statistician, says: "From the standpoint of sustaining balance of trade, products of forest origin have been more consistent than any other comparable group of commodities, and, in the wood and paper group itself, the pulp and paper industry has become the chief contributor. In 1938 this contribution amounted to $145,957,022, being made up of the difference between the value of pulpwood exported and pulpwood imported ($13,435,310), the difference between the value of pulp exported and pulp imported ($27,169,264), and the difference between paper exports and paper imports ($105,352,448)."

Record of Paper Production

The production and value of the products of Canadian paper mills from 1928 to 1939 inclusive are as follows:

Year	Quantity	
	Newsprint, Tons	Other paper, Tons
1928	2,414,393	434,806
1929	2,725,331	471,818
1930	2,497,952	428,835
1931	2,227,052	384,173
1932	1,919,205	371,562
1933	2,021,965	397,455
1934	2,604,973	464,543
1935	2,765,444	515,452
1936	3,225,386	581,943
1937	3,673,886	671,475
1938	2,668,913	580,445

	Value	
	Newsprint	Other paper
1928	$144,146,632	$40,158,773
1929	150,800,157	42,189,095
1930	136,181,883	37,123,991
1931	114,419,637	32,210,252
1932	85,539,852	28,333,271
1933	66,959,501	29,730,374
1934	86,811,460	34,080,765
1935	91,762,201	37,316,185
1936	105,214,533	41,217,401
1937	126,424,303	49,461,120
1938	107,051,202	44,598,863

Note.—In the above tabulation "other paper" includes book and writing paper, wrapping paper, paper boards, and other paper products.

The Allied Lumber Trade

Because the pulp and paper companies are in many cases in the business of supplying sawn lumber to the markets, they are closely bound up with the fortunes of the lumber trade. This trade now is vitally affected by the war, unprecedentedly heavy demands from the United Kingdom being limited apparently only by the shipping facilities available. Before the war the Baltic countries and such European countries as Germany, Poland and Czechoslovakia supplied timber, pulpwood and paper to the United Kingdom and to many British Empire countries. Now these supplies have been entirely cut off in the case of the three European states mentioned and seriously curtailed by blockade difficulties in the case of Norway, Sweden and Finland. One consequence is the switching of heavy orders to Canada by importing firms in Britain, where, in addition to normal requirements, timber is in heavy demand for military uses. This has caused a heavy increase in present and prospective exports from the Atlantic ports of Canada. The situation is somewhat different in British Columbia. The war has shut off much profitable trade from that province, while holding out the alluring possibility of peak exports. A deterrent to heavy shipping traffic is the wartime increase in ocean freight rates and the sharp rise in insurance. Ship's crews demand heavy personal insurance and a bonus. Ocean freight rates to the United Kingdom from the West Coast via the Panama Canal have doubled, while those from Baltic countries have increased four times. The rate across the Atlantic under convoy is not quite double the peacetime rate, so Canada has enjoyed a considerable advantage over Baltic producers. The United Kingdom has purchased some 400,000,000 feet of British Columbia lumber, and British Columbia hopes to sell Britain some 100,000,000 feet a month eventually. So far, however, of the amount purchased only a relatively small amount has been shipped, though arrangements for large-scale shipping are said to be under way.

Harry Field Turns Historian

"The Lindsay Wire Weaving Company—Its First 36 Years", is the title of a tasteful, well printed booklet recently issued in Cleveland. The author is Harry H. Field, treasurer of the company, who, since his self-appointed period of semi-retirement began in February of last year, has found time to complete his "labor of love." In a scope of 40 pages the writer traces the progress of the Lindsay organization from its one-building, six-loom beginnings to its present eight buildings and 64 looms with their capacity 16 times that of the original facilities. An interesting narrative is interspersed with the comments and observations, mostly philosophical or droll, of a very human author.

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Wisconsin Mills Announce Program for Study of Waste Disposal

By J. M. Conway, Chairman Sulphite Pulp Mfrs. Committee on Waste Disposal

Previous announcement by Wisconsin sulphite pulp manufacturers of their intention to study collectively the problem of waste disposal has attracted wide attention, not only within the pulp and paper industry, but also among public officials and agencies interested in the condition of public streams and waters.

As a result of several meetings, ten manufacturers, producing more than ninety per cent of the tonnage of sulphite pulp produced within Wisconsin, perfected an organization known as the Sulphite Pulp Manufacturers' Committee on Waste Disposal. These companies have agreed to finance the necessary research and other investigation and have placed the administration in the hands of an executive committee, comprised of one representative from each company. The chairman of this committee is J. M. Conway, president of the Hoberg Paper Mills, Green Bay, Wis. Cola G. Parker, vice president of Kimberly-Clark Corporation, is financial trustee, and John G. Strange, secretary.

Technical Committee Appointed

Immediately upon organization, a technical committee was appointed, chairmanned by Henry A. Rothchild, technical director of Kimberly-Clark Corporation, with N. L. Malcove, technical superintendent of Northern Paper Mills as secretary. After a series of conferences attended by various authorities on the problems involved, the technical committee presented a detailed report, which has now been acted upon by the executive committee.

At its recent meeting the executive committee authorized immediate action upon several phases of the technical committee's recommendations and appropriated the necessary funds.

The first work to be undertaken is the study of the biological phase of waste disposal, and the employment of a consultant of high standing and wide experience has been authorized. This consultant will have at his disposal the laboratories and facilities of The Institute of Paper Chemistry, Appleton, Wis., which is deemed to be the best equipped institution in the country for this purpose. Following this study, it is contemplated that a pilot plant will be erected and operated for the purpose of determining the feasibility of the results of the laboratory work.

Concurrently with the foregoing program, the committee has authorized a careful and exhaustive study of all presently known processes for handling waste liquors through evaporation and incineration. A number of such processes have been presented to the industry, but there have been widely various opinions as to their feasibility and cost. One of the purposes of this study would be to secure an authoritative answer to this latter question.

The committee pointed out in its statement that one of the difficulties confronting the industry has been the inability of municipal sewage disposal plants to handle the mills' waste sulphite liquors. The committee predicts that the investigations authorized as outlined above will result in a gathering of complete data and a composite report within the current year. It is expected that the work will furnish an authoritative determination of the feasibility of disposing of waste sulphite liquor by biological means.

One of the Greatest Difficulties

The committee further commented that one of the difficulties which has faced not only all industry but also public officials in their consideration of the questions of industrial waste, has been to coordinate and properly evaluate the public necessities with the economic problems of industry in waste disposal. Industry in any state operates in a highly competitive field, and the interests of those employed in industry, as well as the owners of industries, require that waste disposal problems be worked out on a cost basis which does not place the products of a particular producer in a noncompetitive position because of excessive costs. Consideration of these features of the problem leads to the third phase of the work to be undertaken by the committee.

The two activities already authorized are confined strictly to the disposal phases, but this third phase, which is much more profound, involves the question of utilization through the production of by-products which may find or create an entirely new market.

May Take Several Years

It is recognized by the committee that this investigation may take several years and that no statements are presently justified as to the course which this investigation may take. It is the purpose of the Committee to subordinate this portion of the program to the immediate problem of disposal. It has, however, authorized an initial study upon which a report is to be submitted to the executive committee designed to indicate the course which the utilization study may take. The initial study on this phase of the program is to be made by the Institute of Paper Chemistry.

The concluding comment of the committee is that the subject of waste disposal and stream pollution is of national importance and that it is the hope of the Wisconsin mills concerned to be the leaders in the solution of this problem.

Paper from Eucalyptus Tree

VANCOUVER, B. C., February 17, 1940—Comparatively little hope of success in the production of paper from eucalyptus trees in Australia is held out by H. K. Dutcher, Vancouver engineer who has just returned from Australia. Mr. Dutcher left Vancouver three years ago to act as consulting engineer to the Australian Government in connection with a project to develop paper production from the pulp of native Tasmanian gum woods.

Mr. Dutcher states that production of pulp from gumwoods is not likely to be successful as the process is extremely technical and very difficult. The quality of the product produced to date has been far from satisfactory and costs are extremely high.

Kraft Paper Tonnage Establishes New High Record in Last Quarter of Year

By S. M. Hudson, Secretary Kraft Paper Association

The tonnage of kraft paper shipments in 1939 established a new all-time record. Shipments were 16 per cent greater than in 1938 and 12 per cent above 1937, the best previous year. This record was due in part to the very heavy demand during the last four months of the year, an acceleration of purchasing which started with the outbreak of hostilities in Europe.

During the first half of 1939 the demand for kraft paper was running at about 20 per cent above the same six months of 1938. All indications were that consumption was about keeping pace with purchasing and that the increased rate of mill activity was not the result of speculative inventory purchases. In July and August the demand for Kraft declined materially probably below consumption. It was apparent then that the distributors' and converters' stocks were being depleted, and that there would be a heavy demand on mills for shipments during the fall months.

Demand Up Sharply in September

The declaration of hostilities abroad in early September created a buying boom in almost all lines of business and this was reflected by a very sharp acceleration in demand for kraft paper. For several weeks the orders received by the mills climbed to peaks well above any previous experience. This abnormal purchasing resulted both from replenishment of inventories depleted during the summer and from war hysteria creating fear of a shortage of kraft and uncertainty as to future prices. This period of extreme purchasing activity continued for about eight weeks. Averaged out over the four-month period, September through December, orders were not greatly in excess of the anticipated volume as estimated prior to the start of the war. The real effect of the war boom in the case of the Kraft Paper Industry appears to have been the concentration within a few weeks of purchasing which otherwise would have been spread over several months. By the end of the year, the situation had pretty well levelled off. The abnormal backlog of orders had been reduced and current purchasing appeared to be about keeping pace with consumption. It is, therefore, our belief that the total record of 1939 shipments was not materially influenced by the European war.

European Situation Confuses Outlook

Uncertainties as to European developments combined with uncertainties as to prospective domestic conditions make it difficult to foresee the 1940 situation within the Kraft Paper Industry with any clarity The European situation has a very direct bearing on the problems of the Kraft Paper Industry because a considerable tonnage of pulp used in Kraft production comes from the Scandinavian countries. Future prospects as to the quantity of such pulp which may be obtainable and its cost are entirely beclouded. Likewise, there is the question of curtailment of imports of kraft paper. While the quantity of kraft paper imported has never been great, still the complete stoppage of importations would add to the production demands made on domestic manufacturers. Possible demand for export is another questionable factor. In the past the tonnage of kraft exported has been almost negligible but with an interruption in availability of the Scandinavian manufactured product for other foreign markets it is possible that our export demand may increase materially.

Kraft paper is a service commodity used in the wrapping and packaging of other merchandise and the extent of its domestic demand is determined primarily by the volume of sales of general merchandise to be packaged. Thus, the extent of the increased demand for kraft paper will be largely dependent upon the forward movement of general business conditions in this country. A continuation of the improvement in general business activity which started with the outbreak of the war undoubtedly will be reflected by an increase in shipments of kraft paper in 1940 over the 1939 record volume.

Kraft Producers in Good Position

The Kraft Paper Industry is in good position to meet increasing requirements for its product. We believe that it can adequately service any normal increase in demand provided there is an adequate quantity of pulp available. Since the shortage of kraft in the spring of 1937 the kraft manufacturing capacity has been increased greatly through the creation of a reserve capacity well above normal requirements. That reserve, should be adequate to handle expeditiously all but such occasional short buying surges as may result from the simultaneous efforts of buyers to build up speculative inventories.

The history of the Kraft Paper Industry reveals that previous periods of apparent shortage of kraft have not been the result of inadequate producing facilities but rather have been occasioned by an almost simultaneous flood of orders for merchandise required to rebuild inventories. For many years the Industry had an excessive producing capacity which operated at only from 60 to 70 per cent of its potentialities. With this excessive reserve capacity the mills could usually guarantee prompt deliveries even though faced with temporary exceptional peak demands. Under such conditions, merchants, converters and consumers, found it possible to carry minimum inventories and to rebuild these inventories rapidly at times of increased demand. Unfortunately, this situation appears to have led to consideration of inventories more as an opportunity for speculative manoeuvers than as a necessary reservoir for adequate servicing of consumption.

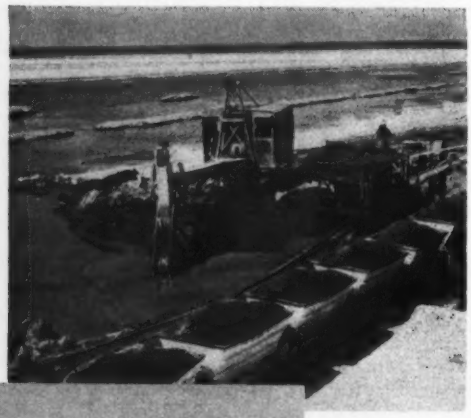
Kraft paper business has no appreciable seasonal cycle. Peaks and valleys in mill orders are, in the main, artificially produced by the rebuilding or liqui-

SALT CAKE . . . f

(Left) 5 giant dryers assure continuous uniform production.

(Below) Strip mining of Nature's Crystals—Loading to mine cars.

(Center, below) Completely owned and operated oil refinery assures adequate fuel supply for dehydrating.



TOWNSITE MACHINE SHOP PLANT

The above panorama shows part of town with plant buildings and stock pile of salt before processing.

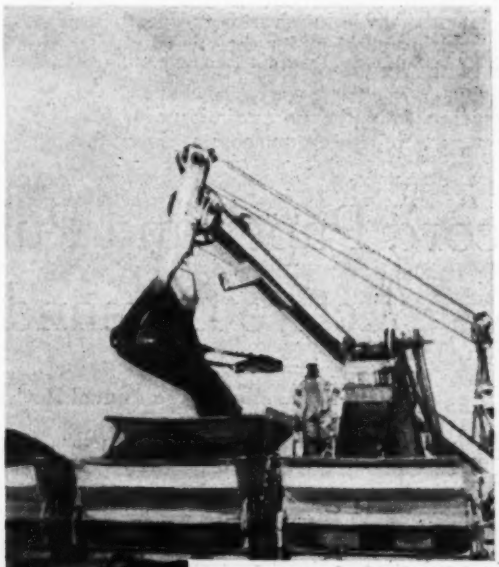
Natural Sodiu m

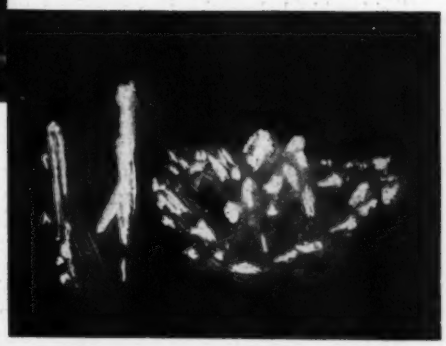
GENERAL SALES OFFICE

for Kraft Pulp . . .

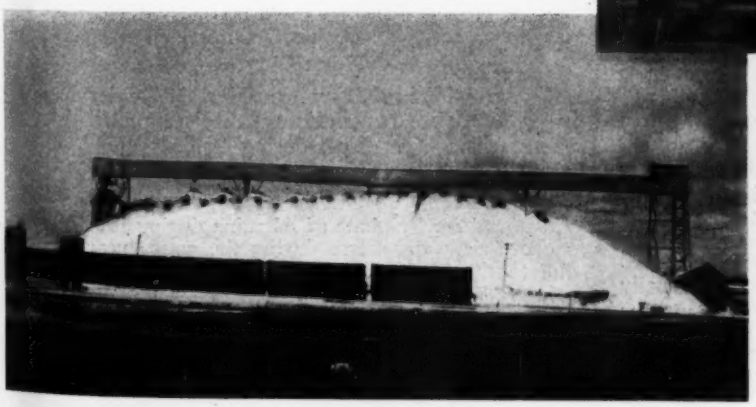
ANY QUANTITY, ANY TIME, FROM THE LARGEST SALT CAKE AND SODIUM SULFATE PRODUCER ON THE AMERICAN CONTINENT.

America's kraft pulp and paper industry is no longer dependent on foreign salt cake producers. Due largely to the bounty of Mother Nature with her deposits of pure natural sulfate and to the technical skill and industry of the Americas' largest producer, Natural Sodium Products Ltd. is supplying the pulp and paper trade of Canada and the United States with high standard salt cake of outstanding strength and purity. Our 90,000 tons capacity of iron and acid free cake can be enlarged and expanded to meet any demand.





Natural crystals of Glauber's salt. Dehydrated, they become salt cake for kraft pulp.



RAW SALT STORAGE

m Products Ltd.

Bishopric, Sask.
Canada

CINCINNATI, OHIO, U.S.A.

dation of intermediate inventories. Thus, at times of prospective increased consumption, frantic efforts by customers to rebuild their inventories lead to an accumulation of such large order files at the mills that delays in shipments are inevitable. A buyers' panic under such circumstances creates a speculative demand which bears no relation to actual consuming requirements. It was such a situation that occasioned the boom market and the apparent shortage of kraft paper in 1933 and again in the early months of 1937. On both occasions speculative purchasing caused a buyers' panic which resulted in building up of excessive intermediate inventories. Each period necessarily was followed by several months of inventory liquidation. To a lesser extent, the excessive demand during last September and October also reflected speculative purchasing. Such movements are usually not predictable in advance and create a most difficult servicing problem for the manufacturers regardless of the extent of their reserve manufacturing capacity.

Recognizing fully the uncertainties of 1940, the kraft paper manufacturers purpose to do everything within their power to serve most effectively whatever requirements may develop. They are maintaining adequate reserve capacity and adequate inventories of standard stock products. They feel confident of their ability to met any reasonable demands made upon them. It is necessary, however, that the consumers and dealers in kraft paper recognize the uncertainties which exist and refrain from expecting the manufacturers to do the impossible. If merchant inventories are carried at adequate levels to meet all reasonable consumptive demands and purchases for the replenishment of inventories are made on an orderly basis, the manufacturers should have no difficulty in servicing all of the requirements of their merchandising outlets.

The kraft paper manufacturers enter 1940 with the belief that this year will be a good business year despite their inability to see more than a few months into the future. They will cooperate with merchants and consumers to the fullest extent and request in return the cooperation of these customers in a manner which will prevent repetition of unnecessary periods of speculation.

Record Paper and Pulp Production Creates Active Demand for Chemicals

Written Especially for the Annual Review Number of the Paper Trade Journal.

During the fall of 1914 domestic chemical prices went to record levels but since September 1, 1939, only moderate advances have occurred.

Casein

Casein production in 1939 was estimated at considerably below the two previous years. No figures are yet available from Washington, but a fair estimate of production in 1939 would be thirty million pounds. Production in 1937 was reported as 67,467,000 pounds, and in 1938, as 48,549,000 pounds.

The year began with prices around 9 cents per pound. Prices dropped, however, to around 7½ cents in April, but due to lack of production, prices improved so that at the Summer, they ranged around 10 to 11 cents. As soon as the hostilities started in Europe, there was an immediate and pronounced increase in prices of all grades, so that the average price between September and December ranged between 15 and 20 cents. These high prices permitted sizable quantities of imported casein, principally Argentine, to come in so that in the last four months of the year, imports were almost 16,000,000 pounds. Prices tapered off toward the end of the year to approximately 15 cents per pound. However, the average price for the year was about 4 cents per pound higher than in the year 1938.

Rosin Size

Rosin and Rosin Size were firm during most of the year. The range was between $4.20 and $6.00. After the war started in Europe, there was a sizable pickup, both in this country and from foreign buyers, and for a short period of time, Gum Rosin of the grades used in paper mills, was actually scarce.

As the government continues to hold large quantities of the 1938-1939 crops under loans, it is believed that Rosin will not reach high points in 1940 unless something unforeseen happens. Although stocks of Rosin as of the first of the year are large, the grades principally used by paper mills, namely F, G & H, are not too large. Therefore, it is not expected that there will be any radical change in the price of Rosin during the first six months of 1940.

China Clay

Consumption in 1939 was considerably heavier than in 1938. Prices remained firm. It is expected that prices will continue firm during 1940.

Sulphate of Alumina

Demand for Sulphate of Alumina during 1939 was good. Prices were firm during the entire year and due to the high rate at which the paper industry operated during the last quarter, consumption was extremely heavy. Iron Free Sulphate of Alumina firmed up somewhat during 1939.

Salt Cake

This country depended largely on imported Salt Cake during the first eight months of the year. When hostilities broke out in Europe, imports from Germany and nearby countries were cut off. This, of course, had a firming effect on the market price of Salt Cake during the last quarter. However, domestic production, both of the synthetic and the natural cake, greatly increased during the year, which prevented a runaway market on this commodity.

Paper Manufacturers Meet In New York

J. L. Riegel, President of Riegel Paper Corp., Heads American Paper and Pulp Association At Sixty-Third Convention At Waldorf-Astoria Hotel — Affiliated Organizations Hold Annual Meetings Paper Week.

The American Paper and Pulp Association and affiliated organizations held its sixty-third Annual Meeting at the Waldorf-Astoria, New York, February 19-23 inclusive. The several divisional meetings were held as usual during the week with the annual open meeting on Wednesday afternoon.

The opening address was delivered by D. Clark Everest, president of the association who retires and is succeeded by John K. Riegel as president of the American Paper and Pulp Association.

A feature of the open meeting was an address by Wendell Berge of the Department of Justice who spoke on the relation of Anti-Trust Laws to trade association activities. Because of the length of time allotted to Mr. Berge the usual committee reports were not made at this meeting.

Election of Officers

At the meeting of the Board of Governors on Wednesday, the following officers of the American Paper and Pulp Association were elected:

President, J. L. Riegel, Riegel Paper Corporation, New York.

Vice-Presidents: D. K. Brown, Neenah Paper Company, Neenah, Wis.; Hugh J. Chisholm, Oxford Paper Company, New York; R. J. Cullen, International Paper Company, New York; D. C. Everest, Marathon Paper Mills Company, Rothschild, Wis.; R. K. Ferguson, St. Regis Paper Company, New York; Ralph A. Hayward, Kalamazoo Vegetable Parchment Company, Parchment, Mich.; W. B. Merlin, Hollingsworth & Whitney Company, New York; John R. Miller, West Virginia Pulp and Paper Company, New York; W. Irving Osborne, Cornell Wood Products Company, Chicago; Cola G. Parker, Kimberly Clark Corporation, Neenah, Wis.; Norman W. Wilson, Hammermill Paper Company, Erie, Pa.; Vertress Young, Gaylord Container Corporation, St. Louis, Mo.; and J. D. Zellerbach, Crown - Zellerbach Corporation, San Francisco, Cal.

Executive Secretary, E. W. Tinker, 122 East 42nd street, New York.

J. L. RIEGEL, President

President's Address

Because 1940 is the 250th anniversary of paper manufacture in the United States, the temptation is strong today to review the accomplishments of the industry. Succeeding generations of artisans lifted paper making from the art and welded it into an industry which today in all of its ramifications ranks 7th among American industries. This is an accomplishment of which we can be exceedingly proud.

In the light of our present knowledge and development we are apt to deprecate the accomplishments of those who preceded us. Today we have tools, the tools of research and the tools of equipment. Our predecessors had none, they began by simple hand methods. By hit or miss invention, some of it I believe inspired, tools were created and with them the industry developed.

The original use of paper was relatively insignificant. There was no ready-made market such as existed for textiles, for lumber, for metals, and for other products. Paper was not an essential *then*. It was purely a luxury available only to a few. It played little part in the every-day affairs of men.

No one can view our tremendous consumption records and the infinite diversity of paper use and fail to realize its essential character today. It holds our civilization and industries together. One can scarcely imagine now any human activity, especially in the United States, that does not in some way depend upon paper.

This transformation from a luxury to an indispensably essential product is an accomplishment of our industry. The process is still going on. New uses are constantly being developed and the consumption of established uses is increasing rapidly. No other old industry has exceeded the 1929 production record, or employment record for that matter, so many times as has the paper industry.

We honor the pioneers and the developers of this industry. We glow with pride when we look back to the fathers and the grandfathers of many in

this room today who contributed to its development. May we in our turn with our tools add as much to our ageless industry.

The pressure of the problems that lie immediately ahead is great. We cannot live in an unresurrected past. That is not our job. It is to meet the issues of our times with that courageous, imaginative spirit which has characterized the approach of those who came before.

Review of Current Situation

There is no need of reviewing our present situation, or what has happened since the beginning of the European War. The flood of orders, the pyramid of production, the threat to European pulp supplies, the re-opening of export markets, these and other things create an immediate situation with far-reaching repercussions.

So far we have avoided panic. We have minimized excessive speculation and we have prevented run-away prices. So far, so good.

Our future action concerns us now. We cannot overemphasize the importance of wise and considerate action, for our position is most critical. We are faced with the necessity of meeting a temporarily expanded domestic requirement, greater to the extent that general business reacts to the demands of belligerent countries and an even more temporary expansion of exports, and at the same time maintain a position best calculated to meet the tests of post-war depression. On the one hand we are likely to be encouraged to extend our production facilities. On the other hand, we know that the facilities that we now have are likely to be too great in subsequent adjustments.

Posed before us in unmistakable terms are correlated series of problems of extraordinary importance, by far transcending the importances of ordinary business problems with which we are familiar. Much more than company interests are at stake. In my opinion, the checks are down. We are going to bat in the clutch.

The present market situation in which price weaknesses are appearing on a rapidly rising cost trend is wholly beside the point. We must look beyond, each of us must plan how best to serve, to meet real and implied obligations, to do our share in a greater game and to preserve our labor and capital position.

Our immediate problem is to maintain confidence, particularly of our customers and our workers during the period of adjustment while consumption is absorbing the stocks which now exist.

The huge backlog of orders of last fall, probably the greatest the industry ever had, could not possibly represent an actual increase in consumption of the same proportions. Although consumption did increase, only by the sheerest flight of imagination could we conceive of its keeping pace with orders which exceeded in some cases by hundreds of percentages the immediately available capacity of the industry. Since late November we have been reducing the backlog. Orders have fallen off. Although a substantial industry backlog still exists, spotty conditions have appeared which are due to maladjustments between mills. The inevitable results of such conditions are apparent to all.

Woodpulp Situation Important

Let us look at some of the underlying factors. The first and most important at the moment is wood pulp. As you know, approximately three-quarters of the wood pulp that is purchased in the United States is imported and about 60 per cent of those imports come from countries that are now either engaged in war or in the neighborhood of actual fighting. We know by the exports of the past few months that for the duration of the war we can expect little if any pulp from Central Europe. We know also that the heroic fight that Finland is making is draining almost to the last remnant the man power and labor resources of that country. Such a fight for freedom cannot be made and industrial production still be maintained. If the war continues, Sweden, Norway, Canada and the United States, in certain grades, are the only substantial pulp producers left in the world to supply the export market. My best calculations show a probable reduction in world exports of about one-third.

At the same time, I think some of us have lost sight of the fact that our consumption of pulp since the beginning of the war has been substantially greater than ever before. This we must keep clearly in mind when we compare pulp imports since September first with those of any other period. Superficially, recent imports may seem adequate; actually they may prove to be far short of maintaining our usual reserve supply.

Moreover, we cannot overlook immediate increases in costs of imported pulp, costs which we as consumers must pay right now. These are not only confined to the greater cargo and insurance rates but to manufacturing costs as well.

These and other facts add up to just one thing, that the price of paper forced by costs over which we, as manufacturers, have no control, is bound to increase if the war continues. The increases must be substantial and they must take place in the near future. Price weakness now, therefore, which encourages the depletion of customer stock and which give rise to false impressions of the market, can cause serious havoc later when these cost elements take effect.

These conditions are only in the beginning. I have gone into some detail with respect to them because they are indicative of a situation which can develop to what end we do not know.

None of us may foresee the duration of the war. We cannot, therefore, adequately plan our action. We do know from experience in the first war that the situation will change rapidly, at times from day to day.

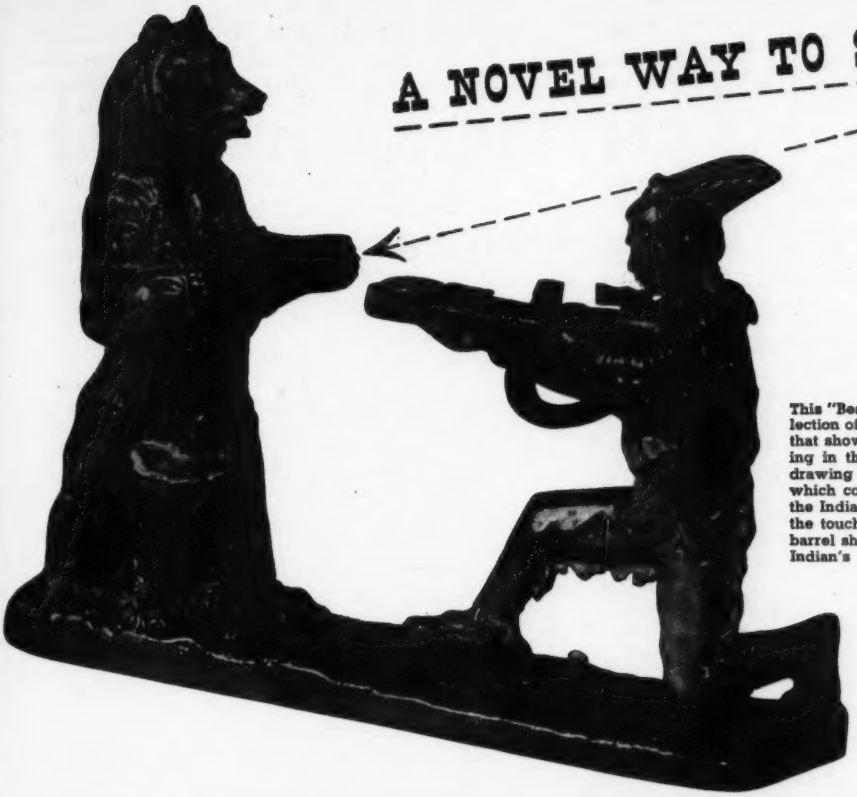
Obviously, we must keep our position as liquid as possible.

Prices Must Be Watched

There isn't a business man in the United States who does not remember that upward spiral of economic activities that accompanied the first world war. Most business men have so far used extraordinarily sound judgment to prevent the recurrence of that condition. Because of the situation which I have just described I believe that our own position is particularly critical. We cannot absorb the increased costs that we face. They must be passed on in the price of our product. In doing so a tendency for prices to run away may develop. This must be watched with great care.

The consequences of too high prices for paper, with which I must admit we have had little experience,

A NOVEL WAY TO SAVE MONEY



This "Bear and Indian" bank is one of a large collection of old-fashioned mechanical savings banks that show how saving money was made interesting in the Gay Nineties. It is set to operate by drawing back a sliding piece on the gun barrel, which cocks a spring inside the gun and brings the Indian's head down into sighting position. At the touch of a lever the coin placed on the gun barrel shoots into the bear through a slot and the Indian's head flies up into erect position again.

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are known, nevertheless, to us all. We cannot look back upon the successive waves of capacity expansion which have followed every period of high prices in our industry and fail to recognize the lesson which is so plainly written. Yet we must frankly admit that on the basis of a number of likely situations which may develop, expansion may appear extremely fascinating. The temptation may prove to be too great and another expansion wave may begin.

The subject of our conduct during the duration of the war could not be adequately covered in a day's discussion. Moreover, we do not know enough at the moment to justify such a discussion. It is plain that to maintain the liquid condition that we must maintain, we must have available at all times dependable records of events and analyses of what these events mean. This brings me to a subject which I wish to discuss frankly with you, the status of our Associations and our use of the facilities which they offer.

As you know, I have been closely connected with the association activities in this industry for a period now of nearly 40 years. I have not only supported the association movement in this industry through dues payments, but I have given much of my personal time in its development. I think none of you can question my sincerity in respect to this subject.

Beginning with the NRA, when the American Paper and Pulp Association was reorganized to its present basis, and when the divisional association structure was completed, we began a new phase of association activities which has proven its worth many times over. Yet, none of us can consider that the present status of our Associations is wholly satisfactory, not because of lack of effort on the part of the industry and staff officers, but chiefly because we are necessarily exploring new fields, creating new precedents, and pioneering new possibilities.

Sound Policy Needed

But I believe now we have discovered the clue. From recent experiences we are finding that industry policy is dependent upon the conglomerate of company policy, that industry policy is worthless unless it is supported by sound company policy. With this understanding we are learning that the staff of officers of our Associations are actually integral parts of each company's organization. We are learning to use their objective consideration of problems to improve, not industry policy, but company policy.

What does this mean with respect to your relationship with your Associations. It means first, to my way of thinking, the insistence upon adequately trained and highly intelligent association personnel. It means adequate financial support to supply such personnel with tools with which to conduct its work. It means, moreover, your confidence in your association men and their work and their confidence in you and the information you report.

Association programs cannot be carried on without money, nor on a penny pinching basis; $100 or $1,000 more or less in dues to any company in this industry has no significance whatsoever in view of the possibilities, not only the possibilities but the necessities.

Gentlemen, today I end my second hitch as President of the American Paper and Pulp Association.

Today, as in 1924, we are turning for leadership to young men. The Board of Governors this afternoon elected to the Presidency of the Association a young man in whom we all have confidence, a man who, as chairman of the Finance Committee of the Association, has known not so much the blessings of the industry as the trials of a finance chairman. You all know to whom I refer, Mr. John Lawrence Riegel, whom we affectionately call Larry. As President of the American Paper and Pulp Association for 1940 I want to introduce Larry to you.

E. W. Tinker, Secretary

Address by Wendell Berge

The annual open meeting of the American Paper and Pulp Association on Wednesday afternoon was addressed on the subject of "The Antitrust Laws and Trade Association" by Wendell Berge, special assistant to the Attorney General of the United States who spoke in part as follows:

"There has never been a time in our history when the preservation of individual enterprise was more important than now. We have built up a tradition that, subject only to the limitations of public interest, free men shall have a right to develop and run their own businesses. A man who has an idea which is not inconsistent with the public interest has a right to promote it and put the result on the market for whatever price he can get in competition with the products of other men's ideas.

"We have long believed that this freedom of enterprise is the best assurance of progress in the development of new industries, in the advancement of the arts and sciences, in raising the standard of living and in obtaining distribution of goods to the largest number of people at the low-

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Kraft Pulps

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est cost. We have long believed that if artificial restraints are not imposed and men are left free to utilize to the maximum their individual capacities, our people as a whole will enjoy a more abundant life than is possible under any other type of economic organization.

Offers the Safest Assurance

"In addition to our belief that individual enterprise produces the most progressive development of living standards and the widest distribution of goods, we also believe that it offers the safest assurance for the preservation of democratic political institutions. There is no major country today that has abandoned the basic characteristics of individual enterprise in its economic life and continued for long under democratic political institutions. Likewise, there is no major country living under political dictatorship where individual enterprise has not also disappeared. One might argue as to which is cause and which effect. However, we do know that in Germany there was a progressive abandonment of competitive enterprise in favor of cartelization for years before Hitler seized power. We know that in other countries the substitution of rigid cartels for free competition preceded the rise of the dictators. A highly organized economic organization is much more inviting to the Hitlers and the Stalins than a decentralized and actively competitive economy.

"So we in this country are becoming increasingly mindful of the need in these perilous times to make our competitive system function effectively. We are more than ever aware of the necessity of keeping the doors of opportunity open for individual effort.

"We have awakened, I hope in time, to the dangers that inhere in the increasing concentration of economic power in the hands of a few. Testimony brought out in the various hearings before the Temporary National Economic Committee emphasizes the virtual disappearance of individual enterprise in many industries. A description of the many devices by which little groups of ambitious men have acquired control of numerous industries would fill volumes. Such a description is beyond the scope of my remarks.

"There is, however, one broadly significant factor to which I wish to call attention. It is the fundamental change that has occurred during the last generation in the practical nature of the problem of monopolies and restraints of trade. Formerly we were most concerned with corporate mergers which gave to a single corporation, or two or three large corporations, the virtual control of an industry. We thought in terms of whether a particular corporation controlled seventy, eighty or ninety per cent of an entire industry. The question was whether the percentage of control was so great as to confer monopolistic power and whether such power had been obtained by illegal means.

The Principal Problem Today

"Although today a few problems of this kind are still left, they do not present the major obstacle to free enterprise, nor do they present the chief challenge to the antitrust laws. The principal problem today is rather that of keeping business organizations which are technically separate and ostensibly competitive from getting together through one subtle device or another to effectually eliminate real competition between them.

"We have the spectacle today of industries in which there are many separate corporations, but those corporations have agreed upon rigid practices of production and distribution which in effect eleminate real competition. Their understandings are sometimes formal but more often informal or even tacit. They result not only in stifling new industrial development which real competition might have inspired, with consequent social and economic loss, but also in the effectual exclusion from the business field of those who are not parties to the understandings. In terms of the consumer, they mean a restricted market, higher prices, and the loss of the benefits of new processes and developments which would normally follow in a market where active competitors are seeking to outdo each other in their race for public favor.

"Businessmen today have a grave responsibility to weigh carefully the meaning of these tendencies that are at work in our economic life. The next ten years are likely to determine whether industry in this country shall on the whole continue in the traditional mold or whether it shall be re-cast in the alien forms of industrial fascism.

Associations Will Play no Small Part

"In determining future trends the activities of businessmen in trade associations will play no small part. The trade association movement has grown by leaps and bounds within the last generation. There is much in it that is good. Trade associations, if properly utilized, can be an important factor in weeding out unfair competitive practices, and in introducing and promoting policies which make industry more efficient and secure a wider and more economical distribution of goods for the benefit of consumers. Trade associations, if intelligently directed by men of vision, can be instruments for expanding trade and commerce rather than restricting it. But whether these associations shall in the long run contribute to the ultimate salvation of our business life or to its destruction depends, I believe, to a large degree upon their fundamental attitude: Are they seeking to expand production and distribution at lower costs so that an ever increasing body of consumers can purchase a greater volume of goods at lower prices; or are they seeking to restrict production, regiment distribution, raise prices and corner the profits for that little group that is fortunate enough to belong to the club?

"When it comes to specific practices, it would be far beyond the scope of a paper of any reasonable length to try to elaborate upon the intricacies of trade association activities. It would also be inappropriate for me as a government official to undertake to advise upon the legality of particular practices. For this sort of advice you will have to go to your own lawyers.

Statistical Reporting Activity

"There are, however, a few general principles affecting specific practices which are fairly clear from court decisions and which appropriately can be reviewed. Undoubtedly, of all the general types of association activity that most frequently called into question is the statistical reporting activity of trade associations. The dissemination of trade information among members is one of the important functions of trade associations. It is also the function most susceptible to abuse."

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by

Mr. Robert McC. Johnstone

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Among the cases involving reporting activities, Mr. Berge mentioned the Hardwood case, the Linseed case, the Maple Flooring and Cement-cases.

Concerted Activities Abandoned

"After the *Schechter* decision" Mr. Berge continued "many industries, upon advice of legal counsel, abandoned those concerted activities which were seen to be obviously in violation of the antitrust laws. Others were less cautious and continued to operate as before or with appropriate modifications. Habits acquired by some businessmen under the unconstitutional N.R.A. have been hard to shake off. But the *Schechter* case left the antitrust laws in full force and effect.

"The codes were held to be an unconstitutional delegation of legislative power. But in the N.R.A. codes, at least, public authority had its hand. Private self-regulation, without the intervention of government authority, is certainly illegal to the extent that it invades the legislative field. Conduct that cannot be constitutionally enforced by public authority, certainly cannot lawfully be exacted by private agencies. Voluntary cooperative activities within trade associations are lawful since the N.R.A. only if they were before. The N.R.A. left us some valuable lessons; it did not leave us any wider freedom under the antitrust laws.

"Since the N.R.A., the only important pronouncement by the Supreme Court in the field of statistical reporting activities is that of the *Sugar Institute* case. The Institute Members agreed to adhere to their published prices until prior public notice of change had been given, and changes were not to become effective until the day after announcement. The Court observed that the more nearly conditions in the trade made for price uniformity, the more important became any impairment of opportunities for competition. The agreement to adhere to announced prices, since it cut off important competitive opportunities, was held to constitute an unreasonable restraint of trade.

Many Other Fields of Activity

"Although most of my discussion has related to statistical reporting, there are, of course, many other fields of trade association activity. Under many of them no antitrust problem ordinarily arises. You are more familiar than I with the many commendable phases of trade association work, such as the promotion of uniform accounting methods, better employer-employee relations, better relations with the government, scientific research, sales, advertising, the hearing and determination of commercial controversies, the elimination of unfair methods of competition, and the improvement of credit relations.

"I ought not to close without some reference to the enforcement policies of the Antitrust Division. Al though the Sherman Act has been on the statute books for fifty years, there has never been any effort until recently to enforce it on a far-flung front. There has never been a time in history when so many complaints of antitrust violation as now have poured in on the Department of Justice. The complaints mostly come from businessmen themselves, which emphasizes that an antitrust case is not a contest of government against business, but rather the issues are between different groups of businessmen—between those who would compete and those who would control the market.

"Within the last year or two there seems to have been borne a new faith on the part of the business community and consumers that perhaps after all the antitrust laws, if vigorously enforced, can check or even reverse the present trend toward concentration of economic control. We expect to go right on enforcing the law to the best of our ability, and to the full extent permitted by the limitations of personnel.

Antitrust Building Investigation

"This association, of course, is not interested in building as such, but the antitrust building investigation is probably the best example of what we believe can be accomplished in freeing private industry generally from artificial restraints, if enough funds are appropriated to do an adequate job. Antitrust enforcement, of course, does not present any budget balancing problem to the federal government because we return to the Treasury more than two dollars in fines and penalties for every dollar we spend in enforcement.

"We plan no major drive on any industry except as conditions in that industry require action on a broad front. We plan no widespread drive against trade associations as such. But when we have evidence of illegal conduct by associations, or groups of associations acting in concert, we will act as vigorously as the limitations of our organization permit. We shall try to prosecute whenever we think the law has been violated. Within the past year, two indictments were returned here in the Southern District of New York against two associations on account of alleged price-fixing and production control activities. The ultimate disposition of these cases should furnish further guides for future trade asosciation conduct.

"Trade associations can do much to put and keep their own houses in order. I come back to the thought which I earlier expressed—that the important thing is the fundamental attitude of trade associations toward the nature of our competitive system. If trade association members and their executives have an intelligent awareness of what is going on today in American economic life, they will be able to see their own activities with reference to the economic picture as a whole. They can then chart their course accordingly. Such awareness, in my opinion, is bound to influence trade association action toward policies that will preserve rather than destroy our competitive system. If policies of this kind are adopted and pursued, I am sure that you will find yourselves treading in the same general direction as your government and that, indeed, law enforcement activity and trade association activity will proceed side by side, each functioning cooperatively as a part of American effort to keep business activity free from illegal restraints.

What the Antitrust Division Can Do

"The Antitrust Division can accomplish the most good by an active investigation policy and by fearless presentation of cases where the evidence indicates violations of law. We have no general regulatory powers like boards or commissions. Hence, we cannot require business to adopt any particular course of conduct. We do not tell business what to do. We indicate through our prosecution policy what it cannot do, leaving open for the free exercise of individual choice the wider area of business activity. This is to the advantage of business because it permits business-men a maximum of freedom. And through the traditional device of consent decrees businessmen may propose constructive solutions of their problems

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PAPER

and secure judicial approval before embarking on an otherwise uncertain course.

"The techniques of enforcement are not perfect, but we must make the most of them because on their ultimate success depends to no small extent the preservation of our traditional economy. We believe that the effort to preserve it is worth making. In the words of David Cushman Coyle in his recent book, *Roads to a New America*:

" 'There are many observers who have no faith in the possibility of restoring any effective freedom to business. They believe that concentration must go on to its final stage at which high finance and the national government become one and the same—the Fascist and Communist "perfect" state. We do not know surely that these observers are wrong. But we know that so long as a strong democratic government exists, it has a chance to exert strong pressure against concentration, and to try all its powers for the restoration of liberty. The example of the Fascist and Communist nations so far does not seem to show better success in providing necessities and comforts than we have had under free capitalism. Moreover, we have a sentimental fondness for liberty. It seems worthwhile not to give up hope but to redouble our efforts to restore a larger measure of freedom in business.' "

Sulphite Paper Association

The Sulphite Paper Manufacturers Association held its annual meeting and luncheon on Monday, February 19, at the Waldorf Astoria. The meeting was addressed by D. C. Everest, president of the American Paper and Pulp Association. George Stuhr of the Southern Kraft Corporation, vice-chairman of the Unbleached Group of the association presided as J. E. Alexander, general chairman, was unable to be present.

Charles W. Boyce, the retiring executive secretary of the American Paper and Pulp Association was present and introduced his successor, E. W. Tinker, former United States Assistant Chief Forester, who affirmed his belief in the characteristic American system of private initiative and said that the American Paper and Pulp Association was a vital necessity to the paper industry and declared that, "Only through organized effort will the industry be protected."

I. Zellerbach of the Crown Zellerbach Corporation and George W. Sisson, Jr., of the Racquette River Paper Company also spoke.

The following officers and board of governors were elected: General Chairman, Leroy F. Porter, sales manager, Northwest Paper Company; Vice-chairman Unbleached Group, George Stuhr, Southern Kraft Corporation; Vice-chairman Bleached Group, Fred W. Cole, sales manager, Fraser Industries, Inc.; Vice-chairman Manila Group, Rufus L. Sisson, Jr., sales manager, Racquette River Paper Company; Vice-chairman Machine Glazed Group, Edgar W. Kiefer, President, Port Huron Sulphite and Paper Company; Board of Governors: John E. Alexander, president and general manager, Nekoosa Edwards Paper Company; Martin A. Brown, treasurer and general manager, Parker Young Company; Walter B. Merlin, vice-president, Hollingsworth & Whitney Company; Harold O. Nichols, eastern sales manager, Crown Zellerbach Corporation; John Stevens, Jr., vice-president, Marathon Paper Mills Company, and Rufus I. Worrell of the Mead Corporation.

Address of President Everest

D. Clark Everest, president of the American Paper and Pulp Association gave the following address:

Your annual meeting, coming as it does on the first day of "Paper Week", seems a fitting place to sound the keynote of the Paper Industry's convention, as I view it.

Incidentally, speaking of "notes", this is my "swan song" as president of the American Paper and Pulp Association and I sincerely hope you will give my successor the same loyal support you have extended to me.

You are all familiar with the happenings of the past year. There is no need to review them except to emphasize the fact that the total production and consumption of all grades of paper and paper board has exceeded any previous year.

During the last three months of 1939 the rate of production and the volume of business placed has far outrun anything previously recorded. Because this high rate has not been maintained recently, some people have become "jittery". We must realize, however, in this connection, that a relatively small proportion of shipments made during the last few months has actually gone into "war work". We were already on a definite upward trend in this country when hostilities broke out in Europe.

Inventories Relatively Low

Inventories were relatively low and many distributors and converters placed business in excess of immediate requirements. This, in addition to a naturally increasing demand, built up a backlog of tonnage which carried many mills over until the end of the year at a high rate of operation. Normally we might have expected a seasonal slump in production during December, but the paper industry, as a whole, during that month, ran at the rate of 91.2 per cent as against 74.4 per cent in 1938 and only 54.5 per cent in 1937. Your Divisional Association figures, were however, somewhat above the average.

January production figures for the whole paper industry have shown an average of a little over 91 per cent, but, of course, there has been a falling off in orders placed. Manufacturers must have known this high operating rate could not go on forever. Anyone, with common sense, must know that during January, which is the normal inventory period of merchants and converters, no business of any consequence is placed usually, and this is particularly true this year after four months of buying at an excessive rate. Whatever excess tonnage is now in the hands of merchants, converters and consumers, beyond their normal inventory requirements, must be used up before we can expect a real resumption of buying.

Pricing Policy Sensible

One thing is to our credit, namely that during the last six months the paper industry has handled its pricing policy in a sensible manner. Some advances were made to bring prices up to a decent level and to cover advancing costs but that was all. Everyone advised their customers not to buy beyond their actual requirements. It was about as safe and sane an exhibition as we have ever seen under similar circumstances because raw materials, as you know, have increased materially so that I doubt very much if the prices of finished paper have kept pace with them.

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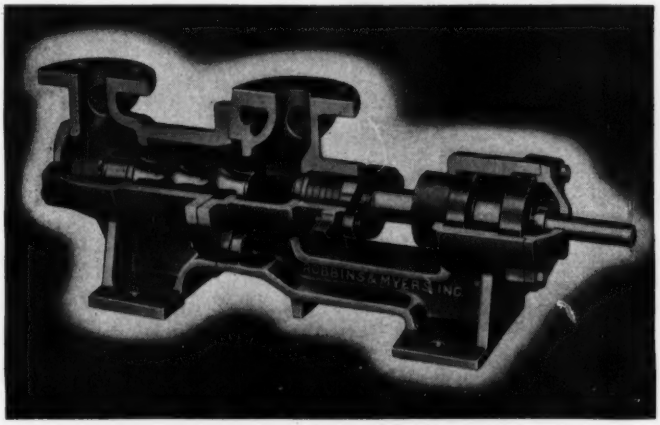

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The Moyno Pump has no valves to cause trouble, no pistons or other reciprocating parts. Internal velocities are extremely low and there is no turbulence, no foaming or cavitation of the slip. The pump is wholly self-priming and furnishes a constant known displacement regardless of the weight or density of the material being pumped. Its extremely simple construction makes it easy to service the two parts subject to abrasive wear —the rotor and stator. When these parts are renewed the pump is practically the same as new.

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That's why I cannot understand why paper manufacturers should get "jittery" now. I think the situation is well in hand although no one can tell what is ahead of us. With the Russian complication in Europe it is definitely certain that the wood pulp situation is one which will give us plenty of headaches over the next six months, if not for many months to come.

Prices of Pulp May Rise

Prices of pulp will rise and there may be a considerable shortage before the war is over. Finland is apparently out of production for some considerable period and Sweden and Norway are in a difficult situation. No imports will be received from the Germans nor from the Czechs.

Canadian exports to this country are, of course, dependent on British requirements. It all adds up to a mighty serious situation and one which is fraught with danger if not properly handled. It is an international problem and one which will require the greatest skill lest we get ourselves into a mess entailing great financial loss following the end of the conflict.

We will never again have the same set-up in relation to imports that we had prior to the war, at least not within my time, maybe yours. Any war situation as complicated as this, is bound to result in new ownerships and new methods of distribution. After this conflict is over, every country in Europe will be anxious to sell many things required in this country. Pulp will certainly be one of them and unless the pulp mills of the Scandinavian countries are completely destroyed, it will not be long before they are again in this market and at mighty low prices. Domestic manufacturers, therefore, will do well to do everything possible to cement customer relationships during the period of the conflict.

Prices Should Be Reasonable

Our policy and the policy of our customers should be to keep our feet on the ground and not try to outguess a European war situation. No one on earth knows the ultimate ramifications of such a conflict. This is no time to rock the boat. Prices should be at reasonable levels and advances made only when forced by increasing costs.

If we should allow the price situation to spiral upward to great heights we well know that later we would have the reaction of swirling downward and to what depths no one can predict.

Naturally price is important, not only with respect to consumption but also, and perhaps more positively, with respcet to production; given an abnormal price situation of any duration, and capital, always restless, will begin to flow into new construction.

We all know, only too well, we have all the productive capacity necessary to take care of all paper and board requirements in this country for some time ahead. Pulp and other raw materials are bound to cause us some difficulty, but when it comes to additional machine capacity it is much more sensible to put up with a temporary shortage than to be loaded to the guards with productive capacity for which it will be absolutely impossible to find a market after the conflict is over.

Operations Must Be Maintained

This industry must have a well maintained operating rate for presently established mills, if we are to continue to enjoy any prosperity. It is time to settle down and not bring in new capacity on every bulge of demand above normal requirements. Our past experience has indicated that when expansion waves begin they always outrun actual requirements with the result that until consumption catches up with capacity mills operate at unprofitable levels.

I trust that through this period of hostilities manufacturers will exercise a better degree of self-control than in the past. We do not want a repetition of the 1918 to 1920 period. Getting off a pinnacle of high prices is a dangerous business and someone always gets hurt.

The responsibility is not wholly upon management, but also upon labor. Any broad effort by labor to hurry wage rate increases before trade conditions and values justify, is bound to increase costs, and such action might be the very thing which would set off the fireworks in an abnormal price scramble which would not be sound or desirable from any angle.

The relationship between labor and management must be more flexible than ever before. We are all rowing in the same boat. Whatever goes up during this conflict, must come down following the conflict and promptly, if we are to maintain our economic position and continue to provide jobs for those dependent on this industry.

To sum up the situation: Let us keep our heads and do our pricing on a sane basis. Let us avoid speculation and urge our customers to buy only for current requirements. Generally speaking, we must keep our parachute in repair and be ready to use it in the event that we have to "bail out," during the coming year.

Cooperation of All Needed

Before closing, I want to ask for your continued support of the splendid work being done by the Sulphite Paper Manufacturers Association, also by the parent association, the American Paper and Pulp Association, which you also support. There has never been greater need for your support than at present. We all know that it will be mighty hard going during the coming months unless we are fully advised as to the facts relating to our business and there is no association in the industry that is better so informed than your own.

Not only is the European situation difficult but with Congress in session it is most important that your parent association receive your hearty cooperation and support.

May I add finally that I trust we may all exert every effort to keep this industry on a safe and sane basis, thus softening the after effects of the conflicts abroad.

Demand Returns to 1937 Level

The association reported that the demand for the grades of paper reported to the Sulphite Paper Manufacturers Association returned to the 1937 level in 1939, having made up the decrease of nearly 9 per cent which occurred in 1938 below 1937.

While the fourth quarter was partly responsible for the increase of over 40,000 tons which occurred in 1939, without the increase of 20,000 tons in that quarter, 1939 would still have shown a substantial increase over 1938.

The average net sales value "per ton" reported for all grades during the year again showed a decrease which this year amounted to $2.44. This would have

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been greater but for a sharp upturn of $3.70 per ton which took place in the last quarter.

It is impossible to estimate what paper requirements will be for 1940 but it would seem that tonnage requirements will at least equal 1939. On account of increasing costs and decreasing pulp supplies it is expected that price trends will continue upward.

Report of Import Committee

The annual report of the Import Committee of the American Paper Industry was delivered by Warren B. Bullock, manager, as follows:—

The present and future effect of the European war on competitive imports of foreign papers has been the principal concern of the Import Committee since the war began.

Before that time imports were increasing to such an extent that competition was becoming acute in various branches of the industry, even though in many fields the growing domestic demand for papers of all kinds obscured the problems of foreign competition. Price cutting imports of wrapping papers were especially troublesome, and other grades were affected to a lesser extent.

Due to the operation of the Reciprocal Trade Agreements and the effort of foreign mills to take advantage of the improved American demand, imports of paper in the first six months of 1939 were higher than in any similar period since 1930. Despite the war, which disturbed shipping in the final quarter of the year, total imports in 1939 were only 4.3 per cent below the value of those of 1938. The tonnage of imports, owing to the lower prices of foreign merchandise, were actually greater in 1939 than in 1937, the previous banner year of the decade.

With the start of the war in Europe, there was an immediate question as to what effect it would have on the American market. Four months have passed and we now have some record of changing conditions. Standard newsprint imports for the final quarter of 1939 were the largest of the year, fifty per cent above those of the first quarter and nearly 300,000 tons larger than in the third quarter. Imports of book and groundwood printing paper were twice those of any of the three preceding quarters, and triple those of the quarter preceding the outbreak of war. Wrapping paper imports, being chiefly from Scandinavia, fell off materially, though sulphite was up to the average for the other three quarters; prices were reduced to offset the higher shipping costs. Writing paper imports fell off, but papeterie and fine tissues were up to the year's average. Paper board imports reached an all time high.

Various factors have entered into the import situation. Were it not for the unprecedented demand for paper during the final quarter of the year, the import situation would have been exceedingly serious. Prices of imported paper were sharply reduced due to the depreciation of foreign currency. This is especially evident in the imports of carbon paper from the United Kingdom. As the pound sterling fell in value, the dutiable value of light weight carbon tissue dropped to 47.9 cents per pound in December of 1939, as against 54.8 cents per pound in 1938, and 49.9 cents in November of 1939. In the heavier weight tissue grades the December value was 39 cents, as against an average of 43 cents in 1938. That this was not merely a price problem is shown by the fact that through the Reciprocal Trade Agreement with the United Kingdom the duty rate was cut in half, and imports in December—a war month—were four times the number of pounds imported in 1938. This may seem like a minor item to some paper manufacturers, but imports of a million dollars worth of paper a year in this one grade is no small matter to the thin paper manufacturers.

A similar situation is found in various other papers imported from nations which devalued their currency, such as cigarette paper from France, and vegetable parchment from Belgium. Also, the average value of kraft paper imported from Scandinavia in 1939 was about half a cent below the value on which duty was paid in 1938.

It is apparent, in a general survey of imports for the war period, that the allied nations are shipping to this country every pound they can produce in order to establish credits against which they can draw for the purchase of war supplies. Neutral countries deprived of their normal markets by blockades are endeavoring to find a market for all of the paper they can produce, and naturally seek the American market where the ruling prices are the highest.

Because of the war in Europe and the consequent increased demand for American papers for export to Latin-America and other parts of the world, as well as the high domestic demand, the paper industry may not be conversant with the adverse developments resulting from the cutting of tariff rates through the Reciprocal Trade Agreements. For instance, import statistics for 1939 show that paper imports increased 55 per cent as compared with 1934, the year before the trade agreement policy became effective. The volume of imports, however, is far less impressive than the fact that the increase under these agreements has been in grades where the immediate and definitely traceable effect was to cause a heavy reduction in the price of the American product. In some cases the foreign paper was actually sold at less than the American cost of production.

This picture is being placed before Congress on behalf of the American paper industry in the hope that the continuance of this policy may be prevented. At a time when American mills would not think of committing themselves to purchasing or selling contracts for more than ninety days in advance, it seems strange that the nation should irrevocably bind itself for three years in advance.

The present problems are being met by the Import Committee as they arise. The future, however, de-

IMPORTS OF PAPERS IN 1939

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
	tons	tons	tons	tons
Standard News.....	1,033,434 pounds	1,353,688 pounds	1,295,280 pounds	1,548,682 pounds
Printing	5,582,189	4,505,473	3,560,320	11,167,412
Kraft	6,556,688	8,003,921	5,522,722	4,877,858
Other Wrapping....	935,825	1,148,193	1,219,663	863,950
Greaseproof	183,761	281,092	95,147	119,252
Writing	288,976	288,517	270,781	183,604
Papeteries	4,993	7,970	7,635	7,966
Tissue—not over 6 lbs.	320,376	268,673	334,288	311,215
Tissue 6—10 lbs.....	157,244	160,611	179,980	105,931
Pulpboard rolls.....	5,644,667	4,906,773	5,081,813	4,537,678
Paper Board.....	6,501,603	10,119,247	9,489,326	10,631,124
Cigarette	3,818,367	3,898,606	3,994,837	3,790,857
Duplex Decalcomania	131,266	231,349	117,679	332,455
Simplex Decalcomania	15,278	37,158	36,733	25,360
Surface Coated.....	266,048	262,389	63,494	97,472
Uncoated, Decorated	11,744	7,898	9,528	3,808
Cigarette Books & Covers	344,397	379,109	334,237	295,553

The principal source of supply of the above papers is as follows: News print, Canada; printing, Canada and Scandinavia; wrapping, Scandinavia; writing and papeterie, France, Czecho-Slovakia, Austria; tissue, United Kingdom and Finland; pulpboard, Canada and Finland; paperboard, Canada and Scandinavia; cigarette, France; decalcomanias, United Kingdom; coated and decorated papers, Germany.

Stretching and inspecting Fourdrinier wires are two of many operations at Lindsay that call for extreme care and thorough training.

A 1200-foot motion picture has been prepared by the Lindsay staff. It traces the manufacture of Fourdrinier wires from the receipt of the raw materials to the shipping department. The entire picture is popular in style, and so is the flexible story that accompanies it. Its appeal, however, is to technical and other practical men, especially to the personnel of companies engaged in paper-making...The Lindsay picture is available to a few groups that are interested.

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mands the most intensive study, for when the war ends there will be a deluge of imports of all kinds from all countries. Every nation whose business has been dislocated by the war can be expected to strain every effort to regain lost markets. Price reduction and dumping can be anticipated, for a loss in financial return will be of much less consequence to such nations than the securing of a re-entry into American markets for commodities whose shipment was curtailed or prevented by the war. This happened before and will happen again, but on a far more extensive scale when the present war ends.

The Import Committee was formed in 1924 *after* the World War to repair damage already done. Today, however, the Paper Industry is implemented with an experienced organization—the Import Committee —which is already "on the job" taking every precaution to meet whatever conditions develop. Equipped to act promptly to prevent drastic raids on our American markets, *before* the damage is done, the Import Committee will be of even greater service to the American Paper Industry than it was in 1924.

John R. Diggs Heads Salesmen

The annual meeting of the Salesmen's Association of the Paper Industry was held at the Waldorf Astoria on Tuesday, February 20 with the election of the following officers: President, John R. Diggs, Mosinee Paper Mills Company; Eastern vice-president, John D. Johnston, Gaylord Container Corporation; Western vice-president, Courtney H. Reeves, Allied Paper Mills; Assistant Eastern vice-president, Howard A. Stone, Jr., Riegel Paper Corporation; Assistant Western vice-president, Burt B. Fisher, Bergstrom Paper Company, and secretary-treasurer, Dr. E. O. Merchant, 122 East 42nd street, New York.

The twenty-first annual luncheon of the Salesmen's Association of the Paper Industry was held in the grand ballroom of the Waldorf-Astoria with about 1100 members and guests present.

At the speakers table were the following: D. Clark Everest, president, American Paper and Pulp Association; Howard H. Harrison, president, American Pulp and Paper Mill Superintendents' Association; E. W. Tinker, executive secretary, American Paper and Pulp Association; Charles W. Boyce, former executive secretary, American Paper and Pulp Association; H. N. Phillips, president, Salesmen's Association of the Paper Industry; J. R. Diggs, Western vice-president, Salesmen's Association of the Paper Industry; John D. Johnston, Eastern vice-president, Salesmen's Association of the Paper Industry; Dr. Frank Kingdom, president, Newark University, and Dr. E. O. Merchant, secretary-treasurer, Salesmen's Association of the Paper Industry.

Raise $1,478 for Finnish Relief

A surprise was introduced at the beginning of the luncheon by the visit of Former President Herbert C. Hoover, who spoke briefly on Finnish relief and expressed his appreciation of the contribution which the American paper and pulp industry has made to this cause. Hugh Phillips directed attention to the envelopes distributed for contribution and the collection was later tabulated at $1,478. Mr. Phillips announced that the association had just previously contributed $100 to the fund. In making his last address Charles W. Boyce, retiring secretary of the American Paper and Pulp Association, said that he was making his "swan song" and took this opportunity of thanking the association for the support given him during his eleven years in office with the association, and urged all members to continue their support of the paper and pulp industry. He expressed the hope that E. W. Tinker, would be given as rough, kindly and frank treatment as he had received. In response, Mr. Tinker said he was placed behind the eight ball "when I followed Charlie Boyce", and stated that the American Paper and Pulp Association was in the enviable position of maintaining the principle of private industry, a principle which he believed in and one that attracted him to the association. He pledged the continued cooperation of the parent association with the Salesmen's Association.

D. Clark Everest, retiring president of the American Paper and Pulp Association said that today the paper industry is faced with more ifs than ever before for no one knows what the outcome of the present economic and physical wars will be and the conditions are becoming more and more involved every day. Business men, he said, will require the greatest of skill in order to keep abreast of the changing conditions. Today, he said, paper prices are lagging behind pulp prices and he suggested to salesmen that if their customers do not buy on a speculative basis, then "we can go through this mess without anyone being injured." He recommended that "we keep our heads and customers maintain their normal purchases; then there will be no reason to get jittery." Should the war be of long duration, he said, a breathing spell of several months will be provided American pulp producers to liquidate their supplies before domestic markets are faced with the situation of competing against a lot of imported pulp at low prices.

Dr. Kingdom's Address

Dr. Frank Kingdom, president of Newark University was the guest speaker and in opening his address said that the world in 1900 to 1910 had a tranquil time and in that peaceful decade America reached its last frontier under Theodore Roosevelt Americans became aware of international complexities. He pointed out that in the next decade from 1910 to 1920, the United States made its entrance into world politics and as a result of the world conflict, emerged as a creditor nation for the first time.

The years 1920-1930 witnessed the world's experiment with the League of Nations. It also witnessed the European deflationary period during which the United States maintained a policy of isolation and went through an inflationary period. The unsoundness of the 1930-40 period commenced by the entrance of Japan into China. It was his opinion that the most important things going on in the world picture are happening in Asia where an equilibrium of power is being sought.

The United States is experimenting, with new policies and new problems which must be settled in the future. Factors entering into the situation include the fact that the United States is preeminent in wealth and power, that the future depends on what we think and do as a nation and that 1940-1950 will see a new set of institutions and relationships.

Four Vital Questions

If the wars continued for the next six months, I do not believe the Balkans could remain out and as the wars are prolonged more and more countries will be drawn into the conflicts—but when that is

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For the Paper Industry

Cotton Rolls
Cotton and Wool Rolls
Interleaved Rolls
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Web Supercalenders
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Embossing Calenders
Plating Calenders
Laboratory Calenders
Burnishing Calenders
Ventilating Fans
Rag Cutters
Stock Cutters
Paper Dampeners
Tensile Testers

Mullen Testers

over we will settle down and ask ourselves what kind of a world are going to have? Four questions must be answered:

No. 1—Can business and industry stabilize itself? 2—What kind of a relationship is going to exist between government and business? 3—Can we keep in this next decade individual freedom?, and 4—what shall be America's part in world politics?

Americans with warped political thinking are not going to get anywhere for the individual no matter what his politics must think of the larger good of the country. Business men must arrive at the solution of at what point business and government can best co-operate, urging upon business men not to appeal to politics to do it for them. There is a great job of social engineering to be done," he said, adding one of the great follies is to be guilty of saying there is nothing we can do about business stability. In other countries governments have taken over business. The objection to permitting politicians to settle the question is that it is never safe to put all your power into any one group or delegate it to any one man for power will corrupt that man.

Business Power Needed

Business men must keep enough power in the hands of business to check against the power of a political government, a problem which is not easy to solve for the interest of the public must be taken into consideration. The normal group to function in such a situation, he declared, is business and although he could not draw a direct line business must say to what degree it can carry on without government aid. The points of co-operation between government and business must be defined. He said he did not want to see the power of government in business increased in this country.

In all the history of mankind the United States, has been the only nation which began on the foundation of freedom and which has carried on with freedom from the day it came into being. America has no background of Feudalism, monarchism or aristocracy and the question of today is whether it is possible for freedom to be kept alive in this modern world. That is the great test for America. Freedom must live in America in order that it may lead the way in bringing peace and sanity to the rest of the world when the war is over. Whenever you come to a crisis there is a great danger in respect to the loss of freedom and there are rules and regulations being made today without the people whom they will affect knowing that they are being made. The government can never take unto itself the powers to absorb the Bill of Rights. No government is going to give security except that government over which you yourself have control. One of the fortunes of the forties will be to keep the torch of freedom alive.

No decision made by this country can fail to affect the nations abroad. We are part of their thinking and they are part of ours. Whatever peace that comes must be based upon justice and that peace must perpetuate the ideals of freedom and the recommendation for a substitute for war is law. We can develop an international law to meet the trials and tribulations which develop without recourse to war and it is vitally essential for America to remain America, he said in closing.

Groundwood Paper Association

The Groundwood Paper Manufacturers Association held its annual meeting at the Waldorf-Astoria, Monday, February 19, when the following officers were elected: President, E. G. Murray, sales managers, St. Regis Paper Company; vice-president, Walter Shorter, International Paper Company. The newly elected board of governors were, C. K. Andrews, Blandin Paper Company, Aubrey Crabtree, Fraser Industries, and W. A. Munroe, Flambeau Paper Company.

Committee on Standards; chairman, Paul Mahony, International Paper Company; John J. Gieseke, St. Regis Paper Company, and F. D. Patterson, Flambeau Paper Company. Aubrey Crabtree and Fred Cole will act as advisors from the board of governors.

Committee on Statistics: chairman, George Fay, Escanaba Paper Company; C. W. Miller, Kimberly-Clark Corporation; Leonard Kuehl, Flambeau Paper Company. C. K. Andrews will act as advisor from the board of governors.

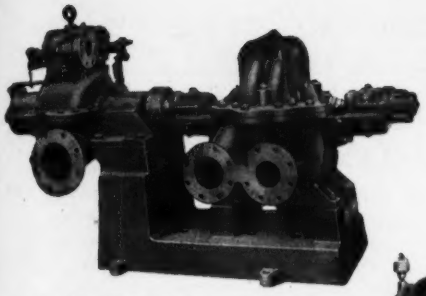
Committee on Manufacturing: chairman, W. D. Maxim, International Paper Company; Aubrey Crabtree, Fraser Industries; E. G. Bennett, Escanaba Paper Company. W. A. Munroe will act as advisor from the board of governors.

Speakers at the general meeting in the morning were Warren Bullock, manager of the Import Committee of the American Paper Industry; E. W. Tinker, secretary of the American Paper and Pulp Association, and Charles W. Boyce, former secretary of the American Paper and Pulp Association.

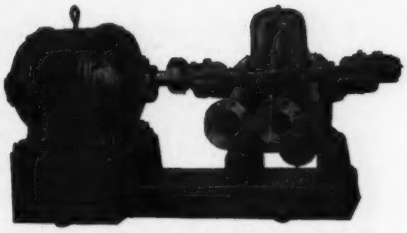
J. H. Coy, president of the Groundwood Paper Manufacturers Association in presenting his annual report spoke in part as follows:

"The present paper market is not soundly constructed, it cannot be when one grade sells at a loss and another at a large profit; when people making high cost papers sell in the price range of much lower cost papers; when habit is followed to the exclusion of intelligence; when whole groups of the industry won't collect even fundamental statistics because they are afraid to face the results which would certainly flow from knowledge of the facts; when people operate mills, hoping for an over-all margin of profit, but without knowledge or apparent interest as to whether it results from exorbitant profit in one grade and offsetting loss in another, or, as of course it should, from reasonable profit from all grades. The list of unsound practices in the industry could be extended without trouble, but why do it? The fact of unsoundness is apparent to anyone who knows the industry and who will think.

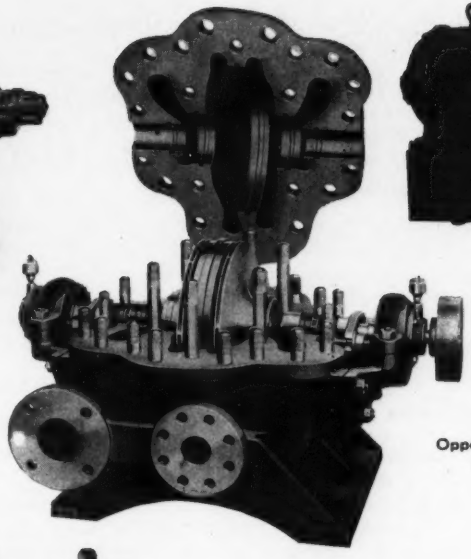
"We, the whole paper industry, this groundwood division, and all the others, cannot afford to enter the coming economic war in this condition of unpreparedness. The time to make changes is when volume is good enough to permit them to be made. No one dares do it when conditions are bad. Now and for the period of this war is when we need our associations most and when we should make them productive to us of what we most need. If there is any sense at all in the industry, it must be perfectly apparent that we must have more detailed factual knowledge of all phases of our industry, more constructive thought applied to the merchandising of paper, more open-minded evaluation of the habits of



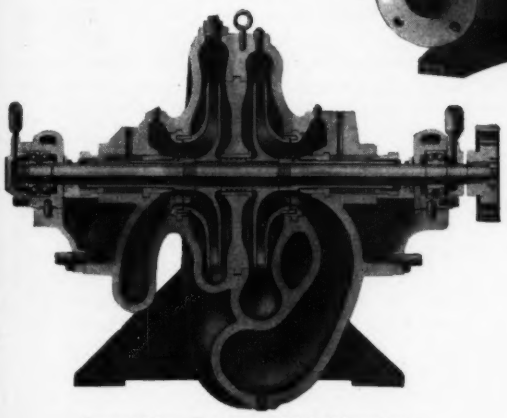
Turbine driven boiler feed pump; 1000 g.p.m. against 807 ft. head at 3500 r.p.m.



Pump with sleeve bearings; 1040 g.p.m. against 259 ft. head at 1750 r.p.m.



Opposed impeller pump with casing cover lifted.



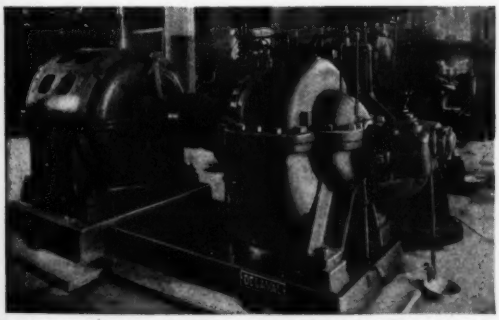
Opposed impeller pump with ball bearings.

DE LAVAL

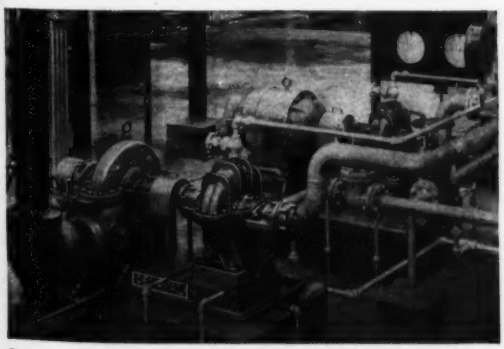
Opposed Impeller

SERIES PUMPS

combine simplicity with high efficiency



Motor driven pump; 2175 g.p.m. against 243 ft. at 1450 r.p.m.



Turbine driven and motor driven pumps handling sodium phenolate solution of 1.15 sp. gr., 46 g.p.m. each against 562 ft. head at 3500 r.p.m.

● Axial balance is obtained by facing the two single suction impellers in opposite directions, which permits of using a short, stiff shaft and reduced clearances, resulting in reduced leakage. Only two pairs of wearing rings to reduce leakage from discharge to suction are needed and leakage between stages is minimized by a labyrinth shaft sleeve, which also protects the shaft from wear, while a bushing protects the diaphragm.

All parts are made to limit gages and parts subject to wear are renewable without replacing main pump parts.

Opposed impeller pumps are built for capacities up to 1500 g.p.m. and for heads up to 750 ft., and higher, depending upon speed and capacity.

We also build single stage, single and double suction pumps for low and moderate heads and multistage, single suction pumps for high heads. State requirements, so that appropriate literature may be sent.

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the industry, more analysis of the problems of our business, and more hard work, intelligent thought and cooperative endeavor applied to the solutions of them. No one man individually can ever know all the problems, much less the solutions for them, and even if he did, he could do nothing about them, but by organizing and utilizing the knowledge acquired through collective effort, each of us will be better able to decide and to act.

"In our paper industry associations, we have the mechanism for necessary collective work—let us use it to the fullest extent for our mutual benefit. Failure to do so at this time particularly, in my opinion, would be gross negligence—neglect of our own self-interest, as well as of our duty as managers of our businesses.

Tissue Association Names Conway

The Tissue Association, at its general industry meeting held on Tuesday, February 20, at the Waldorf-Astoria, elected J. M. Conway, of Hoberg Paper Mills, president. Mr. Conway succeeds George Stuhr, of Southern Kraft Corporation. Dwight G. W. Hollister, of A. P. W. Paper Company, was elected vice president; S. Wishnick, of Park Tissue Mills, treasurer, and Ross A. Fife, assistant treasurer and executive-secretary.

B. F. Picola, treasurer for nine years, has resigned from that position. The group gave him a rising vote of thanks through a resolution presented by Milan Boax, Northern Paper Mills. Mr. Picola continues in the Tissue Association as a member of the governors' board.

In addition to Mr. Picola, those elected to the board of governors were: Howard Larsen, Crystal Tissue Company; J. L. Ober, Scott Paper Company; Sam Lopin, Mazer Paper Mills; W. E. McIntyre, McIntyre Bros. Paper Company; E. W. Kiefer, Port Huron Sulphite Paper Company; B. I. Reider, Victoria Paper Mills, chairman of Roll Toilet Tissue Division; R. B. Stevens, Stevens & Thompson Paper Company, chairman of Interfolded Toilet Tissue Division; William Servotte, Bay West Paper Company, chairman of Paper Towel Division; William Shafer, Jr., Flower City Tissue Mills, chairman of Wrapping Tissue Division; Floyd Graham, Graham Manufacturing Company, chairman of Paper Napkin Division, and R. W. Sweet, Sweet Brothers Paper Company, chairman of Jumbo Roll Division.

An increased budget was voted for the 1940 fiscal year, and the association passed a resolution to institute, through executive secretary Fife, an educational campaign for further support of the American Paper and Pulp Association.

Mr. Kiefer, who presided, talked on conditions in the Baltic and war's effect on raw materials. He declared that it would cause a rise in marine shipping rates, labor and a blanket rise in pulp cost.

E. W. Tinker, successor to C. W. Boyce, retiring executive secretary of the A. P. P. A., was introduced by the latter. Mr. Tinker visualized a growing importance of the A. P. P. A. and affiliated organizations, as new problems in the industrial structure continue.

Mr. Boyce, in his address to the group, stressed that the financial structure of the association is supported by divisional paper associations, and that individual mill memberships exist only through affiliation of the mill with its respective divisional association.

Dwight Hollister's brief remarks emphasized support of the American Paper and Pulp Association. Messrs. Conway and McIntyre pointed out the close relationship between the individual associations and the A. P. P. A.

Glazed and Fancy Paper Association

At the annual meeting of the Glazed and Fancy Paper Manufacturers' Association, held on Monday, February 19, at the Commodore Hotel, the following officers were elected: Harry B. Conklin, president, Louis Dejonge & Co.; Leo R. McDevitt, vice president, Blackstone Glazed Paper Company; George Buell, vice president, Charles W. Williams & Co., Inc.

Arthur A. Thomas was renamed executive director, treasurer and secretary.

The new executive committee includes: John N. Hazen, Hazen Paper Company; Charles Matthias, Matthias Paper Corporation; Francis C. Heywood, Marvellum Company; A. C. Anders, Bradner, Smith Co. Messrs. Hazen and Matthias were elected for two years, and Messrs. Heywood and Anders for one year. The arbitration committee members are: Charles Hoffman, Hughes & Hoffman; William Schild, Chicago Paper Company; William Snow, Middlesex Paper Company; Sam R. Fry, Wyomissing Glazed Paper Company; Ralph Fowler, Hampden Glazed Paper and Card Company.

Merchants through whom are sold the products manufactured by the industry are now eligible for membership in the association, through a new merchandising division. The division was set up, at the meeting, by approval of amendments to the association's constitution.

With the addition of the following merchants to the association, total membership was announced, directly after the meeting, as thirty-two: Frank Schulman Paper Company, New York City; Lachman-Novasel Paper Company, New York City; Bradner, Smith & Co.; Matthias Paper Corporation, Philadelphia; Hughes & Hoffman, New York City; Holyoke Coated and Printed Paper Company, New York City; Charles W. Williams & Co., Inc., New York City.

After the meeting, Royal B. Farnum, director of the Rhode Island School of Design, addressed the group on "Styling Box Papers for Merchandising."

Paper Mill Supply Dealers Dine

About 270 members and guests of the New York Association of Dealers in Paper Mills' Supplies celebrated this association's fourtieth anniversary Tuesday evening, February 20 at the Hotel Commodore, New York. During the dinner a huge birthday cake, studded with two score candles, was carried in to the officers' table with appropriate music and effective spot lighting. The dozen varied features of the entertainment program were greatly enjoyed. Old friendships were renewed and the meeting held together to a late hour. Tables were reserved by the following:—Atlantic By-Products Corporation, D. Benedetto, Inc., Robert Blank, A. Bloch & Co., Brooklyn Paper Stock Corporation, Charles J. Browne, Cantasano Brothers, Inc., Peter Cardinale & Sons, Inc., James Carrano's Sons, Inc., Castle & Overton, Inc., Darmstadt, Scott & Courtney, Derrico Company, Inc., Economy Baler Company, Federal Waste Paper Corporation, James T. Flannery Company, Inc., Gaccione Brothers & Co., Inc., Louis

Gottlieb & Co., John D. Greco, Inc., W. J. Green Company, Inc., I. Hershamn & Co., Inc., Daniel M. Hicks, Inc., E. J. Keller Company, Inc., Loumar Textile By-Products, Inc., N. Mastronardi Sons, Inc., Geo. W. Millar & Co., Inc., Alfred J. Moran, National Association of Waste Material Dealers, Inc., Ruberti Salvage Company, Inc., William Steck & Co., Inc., Sterling Mill Supply Company, Inc., Toga Paper Stock Company, Inc., Valva Paper Stock Company, Walker, Goulard, Plehn Company, Inc., Whaling Waste Products Company, Inc., Wilson Paper Stock Company, Inc.

The Banquet Committee consisted of Walter H. Martens, Chairman, John L. Nielsen and Arthur Rosenfeld.

The officers of the association are as follows:—Julius Levine, president; John L. Nielsen, first vice-persident; Arthur Rosenfeld, second vice-president; Alfred J. Moran, secretary-treasurer.

Paper and Twine Club Dinner

A serious dissertation by John B. Kennedy, combined with frivolous expert professional entertainment, featured the fourth annual banquet of the Paper and Twine Club, Wednesday evening, February 21, at the Waldorf-Astoria.

Mr. Kennedy, former editor of *Collier's Weekly* and radio and news reel commentator, discussing the current war abroad, declared before some 450 diners in the grand ballroom that "it is impossible for might ever to suppress right." History has shown, he added, that persecutors have perished, while victims have been victorious.

Nations must forget force, Mr. Kennedy also emphasized. And, he concluded, since force has failed through the centuries, we must turn to a greater power: faith.

Earlier in the evening—immediately following the rendition of the national anthem—those present stood in profound silent tribute to the recently deceased Howard Reilly, of Graham Paper Company, and William Saltzer, of the Saltzer firm.

James F. Levens, of Geo. A. Millar & Company, member of the club's banquet committee, then introduced W. E. Beier, of Beier & Company, new president of the group, who formally greeted the members and guests.

Amusement contributors included: Billy Glason, Janette Hackett and Girls, Flying Whirlos, Nelson Rae, O'Connor Brothers and Claire, Gwen Marlowe, Glyde Hager, John Steel, Hazel Mangean Girls, Alexander and Santos, Frank Libuse and Company, Art Kahn and orchestra, and Thelma Moore.

Writing Paper Association

At the 79th Annual meeting of the Writing Paper Manufacturers Association held at the Waldorf-Astoria on Tuesday, February 20, Dr. Virgil Jordan, President of the National Industrial Conference Board, discussed the general business outlook for 1940.

A. C. Gilbert, president of the Gilbert Paper Company, Menasha, Wisconsin, was reelected president of the Writing Paper Manufacturers Association, and M. C. Dobrow was again elected executive secretary and treasurer.

The following were elected as the executive committee of the Writing Paper Manufacturers Association: A. C. Gilbert, Gilbert Paper Company, chairman; H. R. Baldwin, Hammermill Paper Company; M. D. Bardeen, Lee Paper Company; G. H. Beckett, The Beckett Paper Company; D. D. Coffin, C. H. Dexter & Sons, Inc.; Bruce Crane, Crane & Company, Inc.; G. B. Fowler, Valley Paper Company; W. J. Garrity, The Munising Paper Company; T. A. Hendry, The Mead Corporation; G. P. Lee, The Parker-Young Company; R. S. Madden, American Writing Paper Corporation; E. A. Oberweiser, Fox River Paper Corporation; F. H. Savage, International Paper Company, W. B. Zimmerman, The Maxwell Paper Company, and J. D. Zink, Strathmore Paper Company.

In Mr. Gilbert's report to the Association members, he said: "The decade which has just ended has been characterized largely by the difficulties of economic depression. To this must be added political developments which have from time to time brought uncertainty, resulting in increased changes and wide fluctuations in the whole economic picture. Industry is no longer solely a matter of production and sale of goods. Our Association has been most helpful in dealing with these varied political and economic problems which management is required to take into account at every point. Through our Association we have made great progress in the development of intelligent, detailed statistics and sound, economic information for guidance in the conduct of our individual mills."

Glassine and Greaseproof Association

Folke Becker, president of the Rhinelander Paper Company was elected chairman of the Glassine and Greaseproof Manufacturers Association at the annual meeting held Wednesday at the Waldorf-Astoria Hotel. The following were elected to the executive committee: Olaf Hedstrom, president, Hartford City Paper Company; Paul E. Hodgdon, president, Deerfield Glassine Company; Harry B. Kuhns, vice president, Nicolet Paper Corporation; Paul F. Moore, president, Westfield River Paper Company; Robert F. Nelson, vice president, Glassine Paper Company; John L. Riegel, president, Riegel Paper Corporation.

While tonnage of all grades shipped by the manufacturers of glassine and greaseproof papers during 1939 showed a sharp upturn over 1938, this was only to be expected in view of the fact that 1938 showed a decrease of 2 percent below 1937, and a decrease of nearly $10 in the average net sales value per ton. The net sales value again decreased in 1939 by nearly $6 per ton. In the meantime costs have steadily increased and still further increases are expected during the current year. In view of the current export business offering in these grades the possibility exists that the total demand for glassine and greaseproof papers may show some increase over 1939 during the current year.

U. S. Pulp Producers Association

At the seventh annual meeting of the United States Pulp Producers Association, held in New York on February 18th, the following were elected as the Association's Executive Board for 1940:

Regional Directors: New England, Amor Hollingsworth, Penobscot Chemical Fibre Company. Middle Atlantic, Norman W. Wilson, Hammermill Paper Company. South, Clyde B. Morgan, Rayonier In-

corporated. Lake States, Stanton W. Mead, Consolidated Water Power and Paper Company. West Coast, Robert B. Wolf, Pulp Division, Weyerhaeuser Timber Company.

Directors at Large: Ossian Anderson, Puget Sound Pulp and Timber Company. Downing P. Brown, Brown Company. J. M. Conway, Hoberg Paper Mills. Stuart B. Copeland, The Northwest Paper Company. U. M. Dickey, Soundview Pulp Company, and A. H. Showalter, Mount Tom Sulphite Pulp Company.

Executive Director, Oliver M. Porter, 122 East 42nd street, New York.

The meeting was unusually well attended. Numerous charts were presented, showing pertinent factors of supply and demand for wood pulp and the relationship of domestic production, imports and exports, as illustrative of the extensive statistical and chart service of the Association.

Guest speakers included F. G. Robinson, recently elected President of the Canadian Pulp and Paper Association, and D. C. Everest, President of the American Paper and Pulp Association.

Specialty Paper and Board Group

Although the Specialty Paper and Board Affiliates will not elect officers until March, Benjamin A. Franklin, secretary-treasurer, announced that all chairmen of the association's six divisions were re-elected at their respective meetings, at the Waldorf-Astoria, covering Tuesday and Wednesday, February 20 and 21.

The groups, with their chairmen, are: Mill blanks, W. B. Sheehan, Missisquoi Paper Company; file folder, P. R. Bachman, Riegel Paper Corporation; tag board, E. F. McIntyre, Champion Paper and Fibre Company; lined board, A. H. Miller, J. P. Lewis Company; bogus bristol, Sam Sutphin, Beveridge Paper Company; special papers for industrial purposes, L. E. Vose, Hollingsworth and Vose Company.

American Waxed Paper Group

Five new directors were elected Tuesday, February 20, for a two-year term, at the annual meeting of the American Waxed Paper Association, held at the Waldorf-Astoria. Their names and affiliations: Marshall H. Smith, Menasha Products Company: L. O. Turner, Detroit Wax Paper Company: R. B. Donnelly, Central Waxed Paper Company; Leslie L. Jacobs, Pollock Paper and Bag Company; A. Southon, Kalamazoo Vegetable Parchment Company.

Directors who have one more year to serve comprise: Stuart Moore, Dixie Wax Paper Company; R. C. McCashey, Minerva Wax Paper Company; Donald Ramsey, Nashua Gummed and Coated Paper Company; A. P. Mitchell, Riegel Paper Corporation; Edgar Berkley, Waxide Paper Corporation. George J. Lincoln, Jr., is executive secretary.

Paper Makers Advertising Association

The twenty-fifth annual meeting of the Paper Makers Advertising Association was held on Monday, February 19, at the Hotel Lexington. The McLaurin-Jones Company, American Writing Paper Company, Mohawk Paper Company, and the Cover Paper Manufacturers Association were admitted to membership at this meeting. All present officers were re-elected, as follows: President, Flloyd Triggs, Riegel Paper Corporation; Eastern vice-president, Edson Dunbar, Crocker, McElwain Company; Western vice-president, E. S. Colvin, Appleton Coated Paper Company; Treasurer, M. A. Park, Marvellum Company; Secretary, R. A. Faulkner, International Paper Company. E. F. Trotter, managing editor of *Printing Magazine,* lead a discussion on Modern trends in printing and their relation to paper mill advertising.

Bristol Board Manufacturers

The Bristol Board Manufacturers Group met at the Waldorf-Astoria Monday, February 19, and elected the following officers: James B. Ramage, chairman, Franklin Paper Company; Joseph E. Holmes, vice chairman, Chemical Paper Manufacturing Company; James L. Ritchie, secretary-treasurer.

Elected members of the executive committee are: Norman Harrower, Linton Brothers & Co.; Joseph E. Holmes, Chemical Paper Manufacturing Company; James F. Ryland, Standard Paper Manufacturing Company; R. I. Worrell, Wheelwright Papers, Inc.; James B. Ramage, Franklin Paper Company; Kendall Wyman, Champion Paper and Fibre Company; Edward Bailey, Hollingsworth & Whitney Company; B. C. Hopper, Hopper Paper Company; Carlton W. Smith, Miamisburg, O.

Association of Newsprint Mfrs.

The annual meeting of the Association of Newsprint Manufacturers of the United States was held at the Waldorf-Astoria on Tuesday, February 20. All the association officers were reelected for 1940 as follows: A. L. Hobson, chairman, St. Croix Paper Company; Samuel Pruyn, vice-chairman, Finch, Pruyn & Co., vice-chairman, J. D. Zellerbach, Crown Zellerbach Corporation.

Advisory Committee Members: George D. Bearce, Main Seaboard Paper Company; Gordon H. P. Gould, Gould Paper Company; R. H. Robinson, Minnesota and Ontario Paper Company, and John H. Smith, Hawley Pulp and Paper Company. Secretary-treasurer, R. S. Kellogg.

Gummed Industries Association

The following were elected as members of the board of governors of the Gummed Industries Association, at the annual meeting on Thursday, February 22, at the Waldorf-Astoria:

R. A. Maish, Dennison Manufacturing Company; W. K. Gerbrick, Central Paper Company; H. W. Stark, Rexford Paper Company; Irving McHenry, Mid-States Gummed Paper Company; F. A. Stocker, Atlantic Gummed Paper Corporation; J. R. Carter, Nashua Gummed & Coated Paper Company; E. B. Livy, Wordendyke Manufacturing Company.

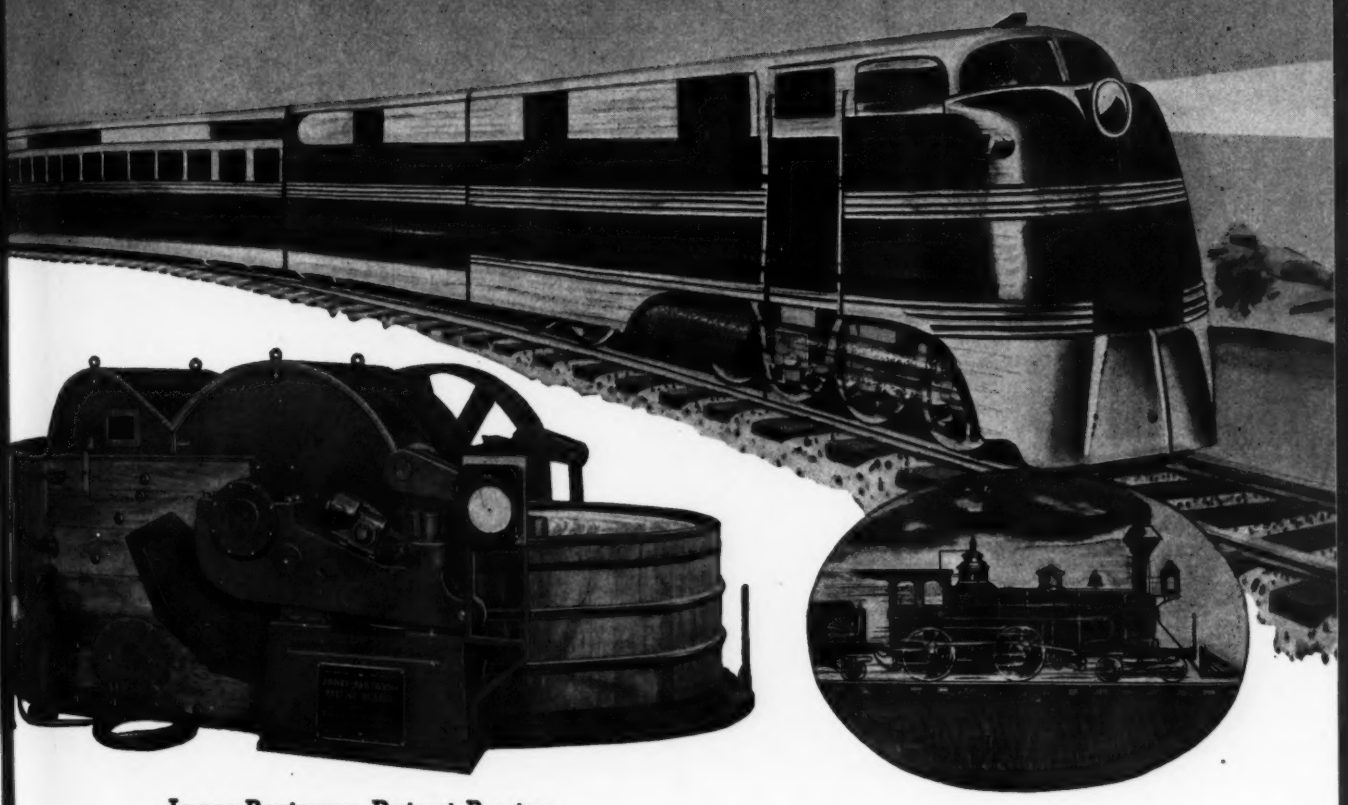
Philip O. Deitsch is secretary, treasurer and managing director.

Soda Pulp Association

The Soda Pulp Manufacturers Association held its meeting at the Waldorf-Astoria on Tuesday, February 20 and elected the following as vice-chairmen: Amor Hollingsworth, Penobscot Chemical Fiber Company; Stuart B. Copeland, Northwest Paper Company; W. D. Duryea, Penobscot Chemical Fiber Company; Clarence Clough, New York and Pennsylvania ompany; R. J. Burt, Mead Sales Company; G. F. Robinson, International Paper Company, and E. J. Thom, E. J. Thom Company. I. Worrell, Mead Sales Company was reelected secretary-treasurer.

The JONES-BERTRAMS Patent Beater

...is *Different* from present-day Hollanders as the "streamliner" is to the antiquated engine...



Jones-Bertrams Patent Beater

Yes, even beaters that some consider modern are just as old-fashioned in principle of design and construction as the antiquated engine is to the "streamliner". A distinct departure from old-style beater design, the Jones-Bertrams Patent Beater is truly tomorrow's Beater today. For, based on any yardstick of measurement, whether wide limits of hydrating . . . wide limits of cutting . . . large power savings . . . automatic beating control . . . duplication of beating cycles . . . saving in floor space . . . and low capital investment per ton of product, it will surpass the most modern Hollanders in every way . . . and with a guaranteed replacement ratio of 4 to 1.

If you measure your beater room efficiency by cost per ton of product governed with desired quality and uniformity . . . you cannot afford to overlook the unusual advantages offered by the Jones-Bertrams Patent Beater. A forty-page Booklet gives the facts. Write for your copy.

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EUROPE—1927 TO 1939: 231 SOLD—155 REPEATS
UNITED STATES—1938-1939: 16 SOLD—5 REPEATS

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Builders of Quality Machinery for Paper Mills

Michigan Superintendents Meet

The Michigan Division of the American Pulp and Paper Mill Superintendents Association held its monthly meeting at the Park Avenue Hotel, Kalamazoo, Mich., Thursday evening February 15 with fifty-three in attendance. Following the routine business, plans for the annual Ladies' Night were discussed and Saturday evening, April 20, was the date decided upon.

Through the courtesy of O. F. Callighan of the Edgar Brothers Company, Curtis Pringle, a former sheriff of Kalamazoo county, but for several years past a manager of a rubber plantation in West Africa, showed a film entitled "An African Safari". Progress of developing a rubber plantation over a period of seven years, from the clearing of the jungle up to the point where the trees have grown to the proportion that the sap is taken, is shown in the film. The talk by Mr. Pringle accompanying the film made the feature an unusual and educational number for the program.

Among those present at the meeting were the following:—Wm. H. Astle, Michigan Paper Company; L. H. Brayfogle, Draper Felts; R. L. Barton and F. L. Brown, Michigan Paper Company; J. H. Brown, American Coating Mills; D. D. Bachelder, Sutherland Paper Company, Harry C. Bradford, Rex Paper Company; Wayne E. Crotty, Bryant Paper Company; F. L. Chapprel, Hercules Powder Company; A. W. Cole, Rex Paper Company; H. C. Church and E. V. Dubamell, American Coating Mills; Paul de Guehery, Michigan Paper Company; F. B. Eilers, Orr Felt Company; M. S. Fogarty, Michigan Paper Company; O. F. Fischer, Bryant Paper Company; H. Heath, Rex Paper Company; W. B. Hadley, Sutherland Paper Company; H. F. Heller, Hercules Powder Company; J. C. Hanchett, Beloit Iron Works; J. A. Heenan, Sutherland Paper Company; A. E. Hays, Michigan Paper Company; G. S. Ingling, Kalamazoo Paper Company; D. E. Jones, E. D. Jones and Sons Company; H. B. Johnston, Allied Paper Mills; A. R. Klosterman, Hercules Powder Company; Wm. Kennedy, Allied Paper Mills; L. H. LaLiberte, President Michigan Division; L. M. Monreig, U. S. Rubber Company; P. F. Neuman, Hercules Powder Company, H. Mendorf, Rex Paper Company; Edward Osborn, Allied Paper Mills; Jacob Parent, A. M. Peterson and C. A. Prang, Noble & Wood Machine Company; Al Perlick, Kalamazoo Vegetable Parchment Company; J. E. Randall, Allied Paper Mills; Douglas Robbins, Douglas Robbins Company; Glen Sutton, Sutherland Paper Company; R. B. Stewart, Kalamazoo Vegetable Parchment Company; C. Baldy Smith, Huron Milling Company; F. K. Dhankweiler, Hercules Powder Company; John Tooker, Hawthorne Paper Company; Joe Waber, Rex Paper Company; Everett G. Walker, French Paper Company; Joe Widmeyer, Allied Paper Mills; Arnold Weller, Sutherland Paper Company; and F. L. Zellers, past national president, French Paper Company.

Government Paper Bids

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., February 21, 1940—The Government Printing Office has received the following bids for 28,000 pounds (1,000,000 sheets) of 50 per cent rag, white M. F. lithograph paper; Aetna Paper Company, 10.13 cents; Mudge Paper Company, 9.04 cents; R. P. Andrews Paper Company, 9.38 cents; Whitaker Paper Company, 10.43 cents; Graham Paper Company, 9.8 cents; Paper Corp., of U. S., 9.37 cents; and Old Dominion Paper Company, 10.739 cents.

For 996 pounds (2,600 sheets) of 30 x 34½ H. F. red sulphite paper; Tarentum Paper Company, 8.95 cents.

For 7,425 pounds (90,000 sheets) of 100 per cent rag, 17¾ x 36¼ white recording chart paper; Barton, Duer & Koch Paper Company, 26 cents; Walker, Goulard Plehn Company, 28 cents; and R. P. Andrews Paper Company, 34.5 cents.

For 10,000 pounds of 21 x 32 and 10,000 pounds 38 x 38 chemical wood manila paper; Barton, Duer & Koch Paper Company, 6 cents; Paper Corporation of U. S., 6.73 cents; Old Dominion Paper Company, 5.99 cents; R. P. Andrews Paper Company, 5.5 cents; Mudge Paper Company, 5.86 cents; and Whitaker Paper Company, 5.7 cents (all or none).

Buys Paper Under Walsh-Healey Act

[FROM OUR REGULAR CORRESPONDENT]

During the week ended February 3, the Government purchased $308,890.75 worth of paper and allied products under the Walsh-Healey Act as follows: $13,827.35 worth of file folders from Josephson Manufacturing Corporation, N. Y. C., for the Navy Department; $30,487.50 worth of paper napkins from L. Hyman & Sons, N. Y. C., for the War Medical Corps.; $52,731.50 worth of fiber containers from Joseph M. Price, trading as Improved Mailing Case Company, N. Y. C., for War Ordnance; $11,465.00 worth of cartons from Edwin J. Schoettle Company, Philadelphia, Pa., for War Ordnance; $24,279.75 worth of fiber containers from Joseph M. Price, trading as Improved Mailing Case Company, N. Y. C., for War Ordnance; $22,514.40 worth of fiber containers from Joseph M. Price, trading as Improved Mailing Case Company, New York, for War Ordnance; $11,445.25 worth fiber containers from Seeley Tube and Box Company, Newark, N. J., for War Ordnance; and $142,140.00 worth of fiber containers from Joseph M. Price, trading as Improved Mailing Case Company, New York, for War Ordnance.

Calco Makes Power Improvements

A new and important addition to the power house at the Bound Brook plant of the Calco Chemical Division of American Cyanamid Company now nearing completion will increase ground area to 20,000 square feet. Necessitated by larger production requirements this expansion furnishes additional evidence of the strong position occupied by the U. S. dye-stuff industry today.

No one individual measure so well shows such a plant's growth as its power requirements. One new steam generator being installed will develop 120,000 pounds of steam per hour. Total consumption of fuel amounts to seven carloads of coal daily. Turbo-generators will develop enough electricity to supply a city of a quarter of a million people.

Engineers who have inspected this plant report it as one of the most efficient in the United States, with one of the highest power production ratios of any industrial plant in the country.

Price Fixing Laid To Cup Institute

The Cup and Container Institute, Inc., 420 Lexington avenue, New York, 10 of its officers and directors and 12 corporations controlling more than 60 per cent of the national output and sale of products of the paper drinking cup and paper food container industry, have been served by the Federal Trade Commission with a complaint alleging a combination and conspiracy to restrain trade through the fixing and maintaining of uniform minimum prices. Eleven of the 12 respondent corporations are or have been members of the institute.

The respondents include Granville P. Rogers, president and executive director of the institute; Dale H. Eckerman, vice president and director; K. L. Stoler, secretary and director, and Alexander Herz and Henry Nias, directors, all of New York; Robert J. Kieckhefer, Milwaukee; William S. Bacon, Kensington, Conn.; Robert C. Fenner, Chicago; E. W. Skinner, Fulton, N. Y. and R. L. Allison, Springfield, Mass., directors; Dixie-Vortex Company, Chicago and Easton, Pa.; Lily-Tulip Cup Corporation, New York and its subsidiary, Crystal Paper Service Corporation, Los Angeles; Herz Cup Company, a division of Herz Manufacturing Corporation, New York; American Lace Paper Company and Milwaukee Lace Paper Company, both of Milwaukee; Eagle Cup Corporation, Brooklyn; The American Paper Goods Company, Kensington, Conn.; Logan Drinking Cup Company, a division of the United States Envelope Company, Springfield and Worcester, Mass.; Sutherland Paper Company, Kalamazoo, Mich.; Sealright Company, Inc., a division of the Oswego Falls Corporation, Fulton, N. Y., and Cupples-Hesse Envelope and Lithographing Company, St. Louis. The last named company, while not a member, allegedly cooperated with the institute in its activities.

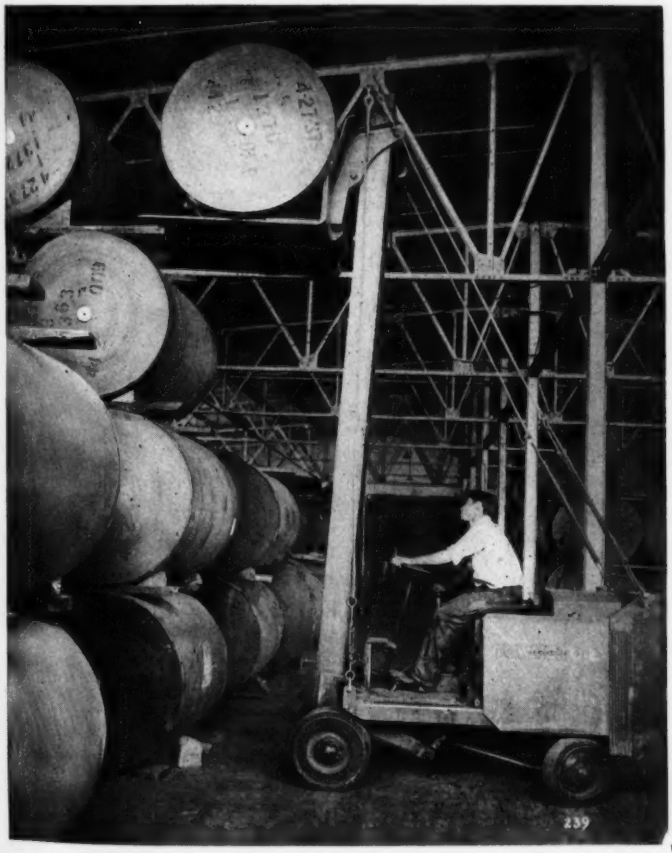
Beginning with the formation of the respondent institute in January, 1933, the corporate respondents, through the respondent institute, are alleged to have effectuated agreements and understandings for suppression of all price competition by fixing and maintaining uniform prices of paper drinking cups, paper food containers, ice cups, ice tubs and related products.

Cardboard Manufacturers Association

Malcolm B. Lowe, of Lowe Paper Company, was elected president of the Cardboard Manufacturers Association at a meeting held on Wednesday, February 21, at the Waldorf-Astoria. Fred C. Heinritz, of Appleton Coated Paper Company, was named vice president, and James L. Ritchie was chosen secretary-treasurer.

Blotting Paper Association

The Blotting Paper Manufacturers Association, at its meeting at the Waldorf-Astoria on Tuesday, February 20, elected Henry S. Mead, of Wrenn Paper Company, as president. Ulysses Bratton, of Rochester Paper Company, was chosen vice-president. James L. Ritchie was re-elected secretary and treasurer.



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SALES OFFICES IN PRINCIPAL CITIES

TAPPI Celebrates Its 25th Anniversary

Technical Association of the Pulp and Paper Industry Is Reported In Splendid Shape Financially and In Other Respects As It Rounds Out Quarter Century—W. H. Swanson Elected President At Annual Meeting.

The Technical Association of the Pulp and Paper Industry celebrated the twenty-fifth anniversary of its organization at its annual convention at the Roosevelt Hotel, New York, February 19 to 22 inclusive. At the annual meeting of the association Walter H. Swanson of the Kimberly-Clark Corporation, Kimberly, Wis., was chosen president, Ralph A. Haywood, president Kalamazoo Vegetable Parchment Company, Kalamazoo, Mich., vice president and the following were elected to the executive committee for a period of three years:—Albert Bankus, vice president, Crown Zellerbach Corporation and Crown Willamette Paper Company, San Francisco, Cal., G. Lamont Bidwell, Jr., Riegel Paper Corporation, Milford, N. J., Merle P. Chaplin, treasurer, Chaplin Corporation, Portland, Me. and John L. Parsons, Hammermill Paper Company, Erie, Pa.

H. E. Fletcher Speaks

H. E. Fletcher, vice president and general manager of the Fletcher Paper Company, Alpena, Mich. and the first president of the Technical Association of the Pulp and Paper Industry 1915-17 inclusive was the principal speaker in the exercises observing the silver anniversary of the association. Mr. Fletcher reviewed in a very interesting manner the early years of the organization.

President's Address

Frederic C. Clark, the retiring president in delivering his annual address spoke as follows:—

May I at this time present to you a brief review of TAPPI activites and offer some comments in regard to the future of our association.

Our meeting this year is our 25th or silver anniversary. Most of those responsible for TAPPI's start are alive today and are active and prominent in our industry. Many of them are with us at this convention. We have had a growth in members, in accomplishments, and in service to our industry that has fully justified the high hopes of those TAPPI organizers. No one who has given of his time in advancing the interests of the association can fail to feel a deep satisfaction at what has been accomplished. I am not going to attempt to discuss TAPPI history because later on in this convention you will have the privilege of hearing of some of TAPPI's early activities, from one who was largely responsible for its start and its early development.

It is my privilege to have been an observer of TAPPI from its early days. I have seen it grow from a small, intimate group, where each knew almost every member, to a great national group with an international membership in every paper making country in the world. In this twenty-five years of growth we have both lost and gained in certain points of value. Our annual and fall meetings have lost much of the intimacy of those meetings of 1915 to 1918. Those meetings were largely discussion groups where fifteen or twenty young technical men met and discussed the technical problems of his own job. Papers presented were largely mill operating problems. I have known of many cases where members carried back to their company much helpful advice as a direct result of these meetings. Our present large meetings are not conducive to these intimate discussions of the early days and so TAPPI has lost something in its growth.

While TAPPI by its growth has lost in some respects it has in others made great gains. Today our large meetings are like forums where new ideas are presented and discussed and where symposiums are

W. H. Swanson, President

R. G. Macdonald, Secretary-Treasurer

held to discuss the various phases of a subject. These meetings have become much like post graduate seminars with informative material presented in lecture form, followed by a brief discussion period. The former meeting with its eight or ten papers has been replaced by a four-day session with its ninety or one hundred papers, divided into divisions or groups of related subjects. In the former days everyone understood or knew something about each paper presented, while today we have a multiplicity of subjects, covering every branch of science and manufacturing.

Today we come to a TAPPI convention, secure a program, and then proceed to pick those papers of greatest personal interest. Thus we select our four-day mental menu. Or perhaps we elect to play hooky from the lecture courses prepared for us and spend our time in the intimacy of old acquaintances. So you have your choice.

Most, if not all, TAPPI members come to these meetings at the expense of their employer and I therefore urge you, in justice to yourself, to your company, and to TAPPI, to make a definite effort to take back to your company something of tangible value and to present it as a written report. Your employer will measure the value of these meetings by what you bring back, that has value. From these meetings you can always take back enthusiasms for your own job.

TAPPI has made many contributions to our industry and perhaps the most important has been in selling the value of technical work to industry. Today we have well over three thousand technical men, while in 1915 I doubt if there were two hundred in the whole industry.

The following is a list of TAPPI activities that are of major importance. Many members do not have a clear picture of association work. This list will serve to show the diversity and extent of our effort in your behalf.

1. Meetings of TAPPI

At the earlier meetings of the association from five to fifteen papers were discussed. At more recent meetings the number of papers presented has been between ninety and one hundred, covering almost the entire field of the industry. These TAPPI meetings have indeed become a forum for the technical developments of our industry.

2. Exchange of Ideas

The growth of the association in personnel and income has made possible an enlarged and improved service to its members. The association is essentially a clearing house for technical information. The distribution of such information is provided through publications, meetings, and correspondence. Every member has specialized knowledge on some phase of pulp and paper making. Outside of the industry there are specialists in many fields related to the industry. Through TAPPI all of these elements are integrated for the common welfare.

3. Publication of Transactions

In 1918 TAPPI began publishing its annual Technical Association Papers, a volume of 64 pages. In 1939 this volume has grown to 712 pages.

4. Text-books on the Manufacture of Pulp and Paper

The preparation, editing the publication of the text-books on the manufacture of pulp and paper as a co-operative undertaking with the Technical Section of the Canadian Pulp and Paper Association has been an outstanding contribution to the industry. Over $80,000 has been spent in the preparation of these five volumes and over 30,000 volumes have been sold. The paper industry may well be proud of this accomplishment, for no other industry has ever attempted anything of its kind.

5. Bibliography of Paper Making and Patent List

TAPPI now issues an annual volume of 250 pages covering the bibliography of paper making and patent list. These bibliographies and patent lists go back to 1900. Here again, no other industry has such a complete list as is contained in these several volumes. This work by Dr. C. J. West is an outstanding contribution to our industry. Dr. Hollis Godfrey, a principal speaker at an early TAPPI banquet, stated that "in the growth of wealth, the growth of factual wealth must precede the growth of material wealth". The Technical Association has certainly contributed a very large part of the factual wealth that has been the foundation for the growth of our industry as measured by improved processes and improved products.

6. Abstracting Service

Our abstract committee reviews and abstracts practically all of the technical articles published anywhere in the paper-making world. Those who follow this service recognize its value and the promptness with which it is brought to our attention. Our abstractors and translators are all in the paper and pulp industry and therefore know the language of the industry, which is most important.

7. TAPPI Committees

In the early days there were only four or five committees and these devoted their efforts to securing meeting papers. Today we have over forty committees in seven divisions and over three hundred committee members. In addition to obtaining papers reflecting technical progress for our two national meetings, these committees make surveys based on mill problems and develop standards and recommended practices for the benefit of the industry. These committees are of great service in assisting the headquarters staff in answering the large number of inquiries on technical subjects presented by members and others. A study and review of committee activity in other national associations in the technical field clearly demonstrates that TAPPI is one of the very few organizations that are successful in its committee work.

8. TAPPI Standards

Through the work of our Testing Division more than 100 standards have been adopted by the association. These standards have attained a very high prestige in industry and commerce and are considered to be the basic authority on the subjects covered. This branch of TAPPI activity may be greatly expanded to the benefit of the entire industry.

9. Local Sections

The growth of the association brought about a need for regional activities. Although two informal local groups existed in the early days at Holyoke and in the Miami Valley, no definite effort toward their organization was necessary until 1929 when our Pacific Coast Section was formed. Today we have seven local Sections with one or two in the process of formation. Some of these sections hold local meetings which are attended by two hundred or more. They have be-

come an important part of TAPPI activity as it brings together the non-technical and technical people of the local and nearby industries.

10. TAPPI Year Book

The annual TAPPI Year Book with its 300 or more pages presents many facts about the organization, its law, its activities, projects, committees, and membership. This Year Book has grown from a dozen pages to its present large size because of the great increase in all TAPPI activities.

11. Special Reports on Manufacturing Problems

These reports are based on special inquiries and surveys dealing with definite mill problems. To date, over three hundred of these reports have been issued. Much valuable information has been secured which is of benefit both to corporate members and to our committee activity.

12. Engineering Data Sheets

The usual engineering hand-books do not contain much engineering data that is primarily applicable to the pulp and paper industry. The publication of Engineering Data Sheets in loose leaf form was begun this year to provide for the constant increase of valuable information needed by Technical Association members. This service further reflects the improvement in facilities for technical information as a result of a growing interest on the part of our members to assist through committees.

13. Vocational Training

A first step has been taken along the lines of vocational training in cooperation with the U. S. Department of Labor and a bulletin on the subject has been published. The work of the text-book committee has provided the necessary text-books on the subject and a number of companies have aided their employees in work along this line. This work should be continued and the next important step should be along the lines of job analysis.

14. Research Promotion

A special committee has been set up, composed of Division chairmen, whose function it is to study committee activity and to select meritorious research projects for recommendation to the Executive Committee. This function of our association will become increasingly important to our industry as time goes on.

15. Financing Research Projects

To date TAPPI has provided over $35,000 for research projects and for special publications needed by the industry. A systematic study of this whole subject is required so that the Association may be assured that TAPPI money will be spent to secure the greatest good to the industry as a whole.

16. Monographs

An effort is being made to provide monographs on important phases of the industry. It is hoped that this activity may soon be gotten under way. A number of subjects are already being considered and the next step is to secure the best talent as author of each subject.

17. TAPPI Medal

TAPPI has to date awarded nine gold medals to those whose achievements have definitely contributed to the technical progress of the pulp and paper industry. The contributions of these nine individuals cover a wide field of activity of far-reaching benefit.

18. Definitions Used in the Pulp and Paper Industry

TAPPI has been a substantial contributor, both in men and money, to this work in cooperation with the American Paper and Pulp Association. The publication of this book of definitions marks another important step forward in the paper industry and provides a set of definitions and terms that will be authoritative in court cases and to the paper trade in general.

19. Color Charts for Fiber Stains

TAPPI has contributed half of the cost of publication of this book of color charts which is now in preparation. Fiber analysis by the use of special stains has become an important part of the work of every testing laboratory. This book will provide a complete set of color charts showing the colors of the various stains when used on the various paper making raw materials. This work has been in cooperation with the American Paper and Pulp Association and the Institute of Paper Chemistry.

20. Cooperation with Other Associations

TAPPI is in continual contact with other technical and engineering societies that are closely allied to our industry. This includes technical associations of our industry in other countries.

21. Employment Exchange

The association is of service both to its members seeking employment and to companies seeking employees. This service has been of special importance during these depression years.

22. The Executive Committee

In the early days the meetings of the executive committee occupied a two or three hour period at the annual meeting. Today Association affairs occupy their time for several days of meetings each year and by correspondence many hours during the year. Your Executive Committee gives whole-hearted attention to Association administration problems. These have been many as a result of the growth of the organization and its steady expansion in activities. In all of this work the committee endeavors to have the Association render greater service to members, consistent with its capacity to do so.

The Future of Our Association

I think we need have little fear for the future of our association. The progress of these first twenty-five years is ample proof of the need of such an association. The association has moved steadily forward and under the guidance of the younger men who follow I look for an even greater growth in the next quarter century.

I urge that those who follow in administration affairs will continue to stress the importance of our committee activities. The membership in each committee is made up of men who are in very closely related fields of work. These committees may easily become the nuclei for the more intimate discussion groups of earlier days. This, I think, is highly important.

We need to greatly increase our TAPPI standards, Special Inquiries, Mill Surveys, Engineering Data Sheets, Monographs and Research work, for herein is continual progress.

Thanks to Officers and Committees of TAPPI

To the officers, members of the executive committee, chairmen of Divisions and committees, and members of TAPPI Committees, may I express my great appreciation for your advice and assistance in TAPPI affairs. We have a great association built entirely by your unselfish efforts. As President of TAPPI, may I express its appreciation to you all for your work well done.

Thanks to R. G. Macdonald and Headquarters Staff

To our able secretary, R. G. Macdonald, may I express the thanks of the association for your enthusiasm which makes for success and for a wholehearted interest in the good of the organization. May I also express to you my personal appreciation of your many helpful suggestions, made possible because of your thorough familiarity with a great mass of TAPPI facts, policies, personalities and objectives. You have been an important factor in the success of TAPPI.

Report of Secretary-Treasurer

R. G. Macdonald, secretary-treasurer of the association presented his annual report as follows:—

The year 1939 of the Technical Association of the Pulp and Paper Industry has been one of progress, particularly in providing increased service to members.

Membership

There were 161 individual members elected in 1939. Sixty-five resigned or were removed from the membership roster. On December 31, 1939 the total individual membership was 1,645.

There was one corporate and six contributing members elected. Five corporate and one contributing members resigned. The corporate membership on December 31, 1939 was 83 and the contributing membership was 92.

The American Coating Mills of Elkhart, Ind., became a corporate member and the following became contributing members:

Atlantic Refining Company, Philadelphia, Pa.
Bristol Company, Waterbury, Conn.
Grinnell Company, Providence, R. I.
United Color and Pigment Company, Newark, N. J.
Monsanto Chemical Company, Everett, Mass.
The Permutit Company, New York, N. Y.

Necrology

The Association lost through death the following members:

J. C. Sanburn, Dan Stacy, R. J. Marx, F. W. Warren, J. A. J. MacKenzie, L. Lynd, A. W. Waern, L. M. Booth, and A. S. Klein.

Special Reports on Manufacturing Problems

In addition to a large amount of technical correspondence handled by the secretary's office, there were several inquiries in which a large number of members participated. In addition, there were several committee surveys. This information was issued to those participating and to our corporate members as Special Reports. Those issued in 1939 were as follows:

No. 292—Power Requirements in Roofiing Felt Paper Mills.
293—Indirect Heated Digester Survey.
294—Rate of Drying Book and Other Printing Papers.
295—Kraft Mill Odors and Their Control.
296—Kraft Mill Odor Literature.
297—Influence of Calender Rolls on Patent Coated Board Finish.
298—Survey of Paper Mill Water Requirements.
299—Elimination of Pitch Troubles.

Employment

The employment of engineers, superintendents, chemists and mill executives in the industry improved considerably as a result of generally improved conditions and considerable number of individuals seeking employment were placed through the Secretary's office. Members and companies are urged to make full use of this service of the association.

Fall Convention

The fall meeting of the Association was held at Syracuse, N. Y., with the Hotel Syracuse as headquarters on September 12-14, 1939 with an attendance of about 650. A detailed report of this meeting appeared in the PAPER TRADE JOURNAL of September 14, 1939. An excellent program was arranged by the local committee under the chairmanship of Carl B. Martin of the St. Regis Paper Company and Carl F. Richter of the Stebbins Engineering and Manufacturing Company.

The 1940 fall convention will be held at Seattle, Wash., in August.

Research Promotion

Four appropriations were approved by the executive committee for financing research projects:

No. 12—$1,000 to the Fundamental Research Committee for the continuation of the study of holocellulose under the direction of G. J. Ritter and W. G. Van Beckum of the Forest Products Laboratory, Madison, Wis.

No. 13—$530 to the Materials of Construction Committee for a survey of materials used for construction in kraft pulp plants, bleaching plants and for general piping under the direction of J. A. Lee, Chairman.

No. 14—$1,000 to the Fundamental Research Committee for the study of the relation of lignin content and associated substances to the physical properties, particularly strength of fiber products under the direction of E. C. Jahn and C. V. Holmberg of the New York State College of Forestry, Syracuse, N. Y.

No. 15—$750 to the Fibrous Materials Testing Committee for the study of the use of hydroxyamines for the determination of cellulose in wood and pulp under the direction of E. C. Jahn of the New York State College of Forestry.

Publications

Each member received in 1939 the following publications:

Bibliography of Papermaking (March).
Technical Association Papers (712 pages) (June).
Year Book (September).
PAPER TRADE JOURNAL (weekly).

TAPPI Data Book.

The Lockwood Trade Journal Company contributed financially to the publication of Technical Association Papers and Henry J. Berger, editor of the PAPER TRADE JOURNAL assisted the secretary in the preparation of the Technical Section of that magazine and the PAPER TRADE JOURNAL. D. J. West prepared the material for the Bibliography and prepared quarterly lists of patents.

The TAPPI Data Book was a new publication and consists of a black looseleaf notebook binder containing sheets on which are printed technical data of use in the mills and not otherwise readily accessible to members. The sheets issued in 1939 were based on similar sheets previously issued by the Technical Section of the Canadian Pulp and Paper Association. The revision of these sheets was made by Vincent F. Waters, technical assistant to the secretary.

Volume V of the Manufacture of Pulp and Paper was published during the year by the McGraw-Hill Book Company. A considerable number of members of the Association assisted in its preparation.

Local Sections

No new local sections were organized during the year and each section continued to hold well attended and interesting meetings. Details concerning these meetings were published in the Year Book and the PAPER TRADE JOURNAL.

Technical Assistant

The headquarters staff was considerably strengthened by the work of Vincent F. Waters as Technical Assistant to the Secretary. Mr. Waters has assisted a large number of the committees in their surveys; prepared the TAPPI Data Sheets and the Special Reports as well as in other ways improving the service of the Association.

Work of the President

It is doubtful if at any time has a President of the Association given as much time and effort to the work of the Association as has Frederic C. Clark. The association was indeed fortunate to have had such able leadership during the past two years.

The TAPPI Medal

By unanimous approval of the Executive Committee, honorable mention and the TAPPI medal was awarded this year to Otto Kress of the Institute of Paper Chemistry.

British Technical Section Visit

Although extensive entertainment plans were made, it was necessary for the Technical Section of the Papermakers' Association of Great Britain and Ireland to cancel its plans to visit Canada and the United States during the past fall because of the war conditions in Europe.

Constitution and By-Laws

A subcommittee of the Executive Committee has prepared a proposed Constitution and By-laws to replace the present Articles of Organization of the Association. Copies have been sent to voting members and a vote is required at this annual meeting.

Special Appropriations

The Executive Committee approved an appropriation of 3,000 dollars to cover the Technical Association's share in the financing of the preparation of color charts to be used in connection with fiber identification. This work is being done by the Institute of Paper Chemistry.

An appropriation of 2,500 dollars was approved by the Executive Committee to assist the American Paper and Pulp Association in financing the preparation of a book of Classification and Definitions of Paper. A similar grant was made in 1938.

Committees and Divisions

There was a general improvement in the committee organization, due in part to a change in organization on the part of several of the committees. Many of the committees reorganized in a way that enabled them to meet more frequently by having most of the committeemen located in the same region as the chairmen. These committees included advisory subcommittees made up of men throughout the country who are leaders in their respective fields.

Several committees conducted surveys and a number of committees arranged programs for the annual meeting. Following are comments covering some of the activities and changes in chairmen of committees and divisions:

Engineering Division, W. G. MacNaughton, News Print Service Bureau, general chairman: There were no changes in chairmanship. L. B. Miller, Keasbey and Mattison, replaced L. M. Booth, deceased, immediately prior to the 1939 annual meeting. The other committees in this division are the Heat and Power Committee, A. E. Montgomery, Chairman, and the Materials of Construction Committee, J. A. Lee, Chairman.

The Heat and Power Committee conducted surveys of drying rates for pulps and heat recovery in sulphite mills, and steam and power unit installations in the paper industry. The Materials of Construction Committees conducted a survey of construction materials used in kraft mills and bleach plants and the Water Committee made in a survey of requirements for mill process water.

Industrial Division: H. P. Cannon, Mutual Boxboard Company, replaced B. M. Thomas as general chairman. There were no other changes.

The committees in this division are the Fibrous Raw Materials Committee, C. W. Boyce, chairman; the Industrial Engineering Committee, L. T. Stevenson, chairman, the Non-Fibrous Raw Materials Committee, H. H. Hanson, chairman and the Waste Committee, L. K. Burnett, chairman.

Converting and Consuming Division, A. W. Nickerson, general chairman: The only changes in this division was the discontinuance of the Paper Bag Committee. The other committees in this division are the Coating Committee, F. W. Egan, chairman; the Container Committee, J. D. Malcolmson, chairman and the Graphic Arts Committee, J. F. Halladay, chairman.

Research and Development Division, C. E. Curran, Forest Products Laboratory, general chairman: The only change in this division was the replacement of W. B. Wheelwright for Harry Weston as chairman

of the History and Biography Committee. The other committees in this division are the Abstracts and Bibliography Committee, C. J. West, chairman; Fundamental Research Committee, H. F. Lewis, chairman and the Patents Committee, C. W. Rivise, chairman.

Pulp Manufacture Division, V. P. Edwardes, International Paper Company replaced W. F. Gillespie, Gaylord Container Corporation as general chairman. H. A. DuBois, Kimberly Clark Corporation replaced R. N. Miller, Oxford Paper Company as chairman of the Acid Pulping Committee. Lyman Beeman, St. Regis Paper Company replaced R. I. Wynn-Roberts, Noble and Wood Machine Company as chairman of the Mechanical Pulping Committee. The other committees in this division are the Alkaline Pulping Committee, Paul Hodges, chairman and the Pulp Purification Committee, Charles Carpenter, chairman.

Paper Manufacture Division, G. Lamont Bidwell, Jr., Riegel Paper Corporation, general chairman: C. M. Connor, Valley Forge Laboratories replaced H. C. Schwalbe, Mead Corporation as chairman of the Preparation of Non-Fibrous Materials Committee and A. E. Bachmann, Missisquoi Corporation replaced E. P. Ingalls, S. D. Warren as chairman of the Forming and Finishing Committee. The other committee in this division is the Stuff Preparation Committee, W. D. Harrison, chairman.

Testing Division: James d'A. Clark, Institute of Paper Chemistry replaced H. W. Morgan, Munising Paper Company as general chairman and W. A. Kirkpatrick, Allied Paper Mills replaced C. E. Peterson, Riegel Paper Corporation as chairman of the Non-Fibrous Materials Testing Committee. The other committees of this division are the Paper Testing Committee, B. W. Scribner, chairman; the Pulp Testing Committee, F. W. Brainerd, chairman and the Optical Properties Committee, J. L. Parsons, chairman. These committees have been acting in developing standard testing methods for the association. The Optical Properties Committee arranged a joint meeting with the Inter-Society Color Council for the annual meeting.

Miscellaneous Committees: W. M. Shoemaker, National Vulcanized Fibre Company replaced M. H. Teaze as chairman of the Finance Committee; The Joint Committee on Approved Pulp Testing Chemists was discontinued and replaced by the Certified Pulp Testers Bureau, Inc., C. W. Boyce, American Paper and Pulp Association, chairman, F. C. Overton, representing the Association of Wood Pulp Importers and R. G. Macdonald, representing the Technical Association of the Pulp and Paper Industry; R. C. Griffin continued as chairman of the Standards Committee; John L. Parsons as chairman of the Research Promotion Committee and George Carruthers as chairman of the Joint Textbook Committee.

Medal for Outstanding Service to Paper Industry Awarded to Dr. Otto Kress

By unanimous vote of the executive committee of the Technical Association of the Pulp and Paper Industry, honorable mention and the TAPPI medal were awarded to Dr. Otto Kress, Technical Director of the Institute of Paper Chemistry. The presentation was made by Ernst Mahler, executive vice-president of the Kimberly-Clark Corporation, at the luncheon at the Hotel Roosevelt, Wednesday afternoon, February 21. Mr. Mahler spoke as follows:

Dr. Otto Kress

Presentation Address by E. Mahler

I am proud to be chosen as the medium for bestowing the TAPPI gold medal upon my friend of many years, Dr. Otto Kress. For in honoring him, the Technical Association honors itself. It has been wisely said that "a favor well bestowed is almost as great an honor to him who confers it as to him who receives it."

Dr. Kress, in one capacity or other, you and I have collaborated for nearly thirty years. The inspiration gained from each association has only deepened my admiration for you. Endowed with excellent mental capacity, but considerably more important, with fathomless energy and curiosity, your enthusiasm has profoundly touched those who are fortunate enough to have personal contact with you and has manifested in many accomplishments and publications which have been beneficial to the industry and its members at all times.

In order to refresh the memories of those who are assembled here today, I would like to recount briefly some of the high points in the career of Dr. Kress thus far. I say "thus far" advisedly, lest this sound too much like a baccalaureate. Because there has been no waning of enthusiasm, no let-up in productivity. If possible, there is more of these than ever. And I for one, regard his present position with greater envy than anything that has gone before.

In 1906, Otto Kress received the degree of Bachelor of Science and the Illig medal from Columbia University. Encouraged by the offer of a teaching fellowship, he continued with post graduate work, having

the fortunate experience of acting as private assistant to the eminent Dr. Chandler, who was at that time head of the chemistry department. Three years of hard work culminated in the degree of Doctor of Philosophy and marked the beginning of a long and continuous association with the pulp and paper industry.

After a few years with the Badische Company, Dr. Kress joined the staff of the Forest Products Laboratory in Madison, Wis. Inevitably, his vitality stimulated the organization and enlarged its activities in the pulp and paper field. In 1918 he was directly employed by the industry, and after two years with the Consolidated Water Power and Paper Company, he acted as superintendent of manufacture for the Thilmany Pulp and Paper Company until 1928. One year later, he became technical director of the newly formed Institute of Paper Chemistry. In that capacity he has functioned ever since.

Active Member of TAPPI

A member of the Technical Association since 1915, he has participated actively in its growth. Member and chairman of several committees, including the executive committee, he played an important part in spreading the technical ideal in the industry and was instrumental in founding one of the most active groups, the Lake States Section.

While publications are not by any means a complete index of achievement, Dr. Kress has figured as author of fifty plus to date, and there are more than thirty United States and foreign patents bearing his name. One of the early full-fledged scientists to join the industry in this country, he has participated in and witnessed many of the modern refinements that augment our processes.

Earlier, I made pressing reference to the astounding energy which everyone has remarked in Otto Kress. Not many know, because he would not tell, that in his youth one outlet for this vitality was competitive swimming. Good swimming, because as a quantity of trophies will testify, Kress was once a national figure in the sport. In more recent years this same energy, compounded with a healthy curiosity, has led Dr. Kress into far parts of the world. I cannot say how many countries he has visited, nor how many times. But if you want some fun, get him to tell you of his experiences. I promise you they are unique—and fascinating.

Present Activities

Every personality has many facets. To me, the most interesting and significant phase of Otto Kress' activities are those of the present—those which cause some of his students to refer to him as the "Herr Professor."

A little over ten years ago, when I was charged, at the behest of mutual friends, to form the small beginnings of what is now The Institute of Paper Chemistry, I accepted the responsibility with the knowledge that Kress' services could be secured. I know that besides a great many "headaches" (one of Dr. Kress's favorite words), this new venture called for a very real financial sacrifice on his part and a challenge to the future. His immediate and enthusiastic willingness to be technical director, the only full-time teacher and general factotem, including millwright and janitor has been one of the cornerstones of the Institute. His inspirational leadership is certified by the solid admiration which the students accord him and by the serious perspective which they bring to their studies and the records they are making in industry.

Developing Men

An industry is measured by the men that comprise it. They are its blood stream. And if you want to prophesy the future of a field, look at the young men, the fresh blood and vitality it is attracting, and you have a better criterion than any other to judge it by.

Dr. Kress, I envy you the opportunity of moulding and developing the fine, purposeful young men that come to you at the Institute. Even more, I envy those same young men who have (and will have, I hope, for many years) the privilege of sitting at your feet. Through them you are making an impression on this grand industry, giving it a shape, that will last for many years and form one of the important chapters in the history of pulp and paper.

So—Professor Doctor Kress, I salute you personally, and on behalf of TAPPI express sincere congratulations and wishes for a long and active career.

Response by Otto Kress

Dr. Kress responded as follows:—

Needless to say, I appreciate very deeply the honor which the Technical Association has conferred in making me the 1940 recipient of the TAPPI award. When, in 1933, I was privileged by the association to make the presentation to Mr. Mahler, I little thought that at a future date he would reciprocate. I also feel deeply grateful that Mr. Mahler, whose friendship I value so highly, has consented to make the presentation remarks.

Mr. Mahler has already covered the essential points of my professional career. I shall therefore outline very briefly my experience to date, restricting my remarks, for the most part, to my association with The Institute of Paper Chemistry, which is the work in which I am engaged at the present time and which is to me the most interesting and important work of my professional career.

Gets Ph.D. Degree in 1909

I received the degree of Doctor of Philosophy from Columbia University in 1909 and since that time have in some way been connected with the pulp and paper industry. A few years were spent as technical dyestuff expert for the largest of the German color houses.

During the World War, I severed that connection and became associated with the Forest Products Laboratory at Madison, Wis., where I was in charge of the section of pulp and paper for several years. Since that time, with the exception of one year spent in the employ of the Du Pont Company, I was directly connected in various capacities with the field of pulp and papermaking until the winter of 1929. I then became associated with The Institute of Paper Chemistry as technical Director and have held that position since that time. As my present activity, to me at least, is without question the most interesting and satisfying work with which I have been associated, I should like at this time to sketch for you briefly the development of the Institute to the present date.

Paper Men Agree to Finance Institute

The Institute of Paper Chemistry was established through the vision of a group of Wisconsin pulp and paper mill executives, who agreed to finance it for a period of five years. At the end of that period, the

Institute found itself national in scope, drawing its support from mills all over the United States. As established, the Institute had and has now three primary objectives: first, the training of a limited group of students at the post graduate level; second, the establishment of a library dealing with pulp and paper and its related fields; and, third, the conducting of suitable research work both of a purely scientific nature and also of a practical nature. It was originally planned that the degree of Master of Science would be granted at the end of one year's residence and upon the completion of a satisfactory Master's thesis, and that two additional years of residence and the completion of a satisfactory Doctor's dissertation would be required for the Doctor of Philosophy degree. It early developed, however, that three years were insufficient, so that the residence requirement is now four years, the Master's degree being granted at the end of the two-year period and the Doctor's degree at the end of the four-year period.

The Institute of Paper Chemistry was established in affiliation with Lawrence College, also located at Appleton. This choice was particularly fortunate, not only in view of the fact that Lawrence College has the authority to grant the Doctor of Philosophy degree, but also in view of the fact that a few of the teaching staff from Lawrence College could be employed on a part-time basis at the Institute. The president of Lawrence College automatically becomes the director of The Institute of Paper Chemistry and is represented on the board of trustees in that capacity.

When The Institute of Paper Chemistry opened its doors in February, 1930, arrangements had been made with Lawrence College for the occupancy of rooms on the top floor of the new Alexander Gymnasium, which were converted into offices and laboratories. Naturally, this arrangement was far from ideal from the standpoint of facilities and equipment, and I was the only full-time instructor available in the field of pulp and papermaking. The class entering the Institute in February, 1930, consisted of three students, one of whom discontinued in June of that year to return to mill work; the other two completed the required curriculum, receiving the Doctor's degree after three years' attendance at the Institute. By the fall of 1930, the staff of the Institute had already been enlarged through the employment of several specialists who were recognized in their respective fields. Since that time, the effect of the Institute has been directed toward the organization of a staff of specialists who are experts in their chosen fields; the policy has been to select older men when adding members to the staff, so that they would give to the Institute the advantage of their years of experience and, in addition, there would be less turnover of the staff. Today the personnel of the Institute totals 88 full-time members, and the ratio of student body to faculty is approximately two to one. Our students come to the Institute from all parts of the country.

Thirty-five Colleges Represented

At present, our student body numbers 51, representing graduates of 35 colleges and universities. The physical assets of the Institute have also increased remarkably through the erection of the first Institute building, followed by the Kimberly Memorial Library, which was donated by Mr. J. C. Kimberly in memory of his father. As the needs of the Institute developed, the original building was enlarged to approximately twice its original floor space. In time, still additional space was required for special work, and several small buildings were erected to meet this need. At the present time, all of the available space is in actual use. From the standpoint of equipment the Institute has splendid facilities, much of the equipment having been made available through donations. Based upon the insurance carried, the Institute figures its present assets at approximately one million dollars.

Realization of a Dream

The Institute of Paper Chemistry, which is the realization of a dream and a vision, is, of course, not the result of the efforts of any one individual. Nevertheless, much of the success of this enterprise is due to the vision of Mr. Ernst Mahler, who has served as president of the board of trustees since the establishment of the Institute and who has given unreservedly of his time, energy, and finances to assist in the development of the Institute in an orderly and progressive manner. The board of trustees, the staff, and the student body on the one hand, and the mills and allied industry for whom we are permitted to do research work on the other hand, have all contributed in bringing the Institute to its present development. It is this work in which I am at present engaged that I have found to be so satisfying, as the opportunity is presented not only to help in conducting suitable research work but, more important, to pass on to a limited group of intelligent and interested young men the information which has been accumulated through the past ages and thus fit them for a career in their chosen field of pulp and paper manufacture.

U. S. and Free Laboratories Merge

The United States Testing Company, Inc. announces the merger of the personnel and facilities of the E. E. Free Laboratories with the Testing Company. Dr. E. E. Free, before his death last November, was very active and well-known in many fields of scientific testing and research.

He operated laboratories specializing in acoustics, light, electronics, vibration control and general physics. The E. E. Free Laboratories have played an important part in many new developments in engineering, and the merger with the Testing Company will permit the rendering of even greater services in the fields of testing and research.

The complete equipment, staff and associates of the E. E. Free Laboratories will be maintained at their present location—175 Fifth avenue, corner of 23rd street, New York. Mr. Douty, president of the United States Testing Company, Inc., points out that E. A. Graham, formerly associated with Dr. Free, will manage the laboratories which will be known as the Engineering and Research Division of the Testing Company

Powell River Co. Erects Laboratory

Erection of a new laboratory at Powell River, B. C., has now been started for the Powel River Company at a cost of approximately $45,000. Plans show a two-story building, measuring 50 by 85 feet. It is to be of frame construction on concrete foundations, with exterior finish of cedar siding and roofing of tar and gravel type. Steam heating will be provided in the new building by means of an extension of the company's existing steam heating system in the plant.

An Evaluation of Calcium Carbonate Coating Colors Formulated With Various Adhesives*

By Howard F. Roderick[1] and A. E. Hughes[2]

Abstract

Various adhesives suitable for use in the preparation of coated papers are described. These adhesives include casein, soya bean protein and a number of the starches. Their evaluation is based upon the properties they impart to finished coated papers. Each adhesive was incorporated in varying amounts in coating colors carrying 100 per cent calcium carbonate as the pigment and also in required amounts for a Dennison wax test of 4 to 5 with blends of calcium carbonate and clay. The evaluations given are taken from the calendered sheets and the effect of each adhesive on the various characteristics of the finished paper is presented graphically.

A discussion of various adhesives employed in the manufacture of coated papers is appropriate at this time. Variations in the market price and the available supplies of certain adhesives which are used extensively in the manufacture of coated papers may necessitate consideration of other adhesives. As we all know, casein is widely used in this field and, while it possesses some undesirable features, it is still considered a very satisfactory adhesive for use in the preparation of most coating colors. Recent developments in this field have shown that a number of substances are suitable for incorporating in the coating color as the adhesive. These, however, are only a small portion of the total number of known adhesives for general purposes.

Adhesives suitable for use in coated papers are limited, because certain physical and some chemical characteristics are imperative. Some of these characteristics or requirements are:

(1) High bonding strength and the ability to eliminate dusting.
(2) Little or no tendency toward lowering the brightness and opacity of the finished paper.
(3) Variations in viscosity with minimum deviations from standard formulas.
(4) Desirable wetting power.
(5) Production of papers of high finish and desirable printing properties.
(6) Little or no undesirable odor or other obnoxious characteristics.
(7) Must not lend itself to a chemical deterioration in the finished paper.
(8) Price range of the adhesive should be of such a magnitude as to enable its use in coated paper.

Adhesives which comply more or less with these requirements are found among the following:

(1) Casein.
(2) Glues (animal origin).
(3) Soya bean protein (from the soy bean).
(4) Starches (corn and tapioca).
(5) Gums (vegetable origin).

Casein, soya bean protein, and the starches are the most commonly known adhesives. Therefore, the findings reported relate to these substances. The plan of the work in general is that of establishing the most desirable adhesive for certain types of coated papers employing various pigments. A more general study than the one presented here would serve to make possible a systematic substitution of one adhesive for another, if desirable.

* Presented at the Annual Meeting of the Technical Association of the Pulp and Paper Industry, Roosevelt Hotel, New York, N. Y., Feb. 19-22, 1940.

[1] Member TAPPI, Director of Research, Michigan Alkali Co., Wyandotte, Mich.
[2] Research Laboratories, Michigan Alkali Co., Wyandotte, Mich.

Materials and Methods

The casein used was a granular material, and it is representative of the average grades employed by most coating mills. It is readily dissolved by heating to 130 deg. F. in the ratio of 100 parts of casein to 600 parts of water containing 16 parts of mixed alkali (2 parts of soda ash to 1 part of borax).

The starches available to the paper manufacturer are many and varied, depending on their source and method of production. Some of the starches are raw and some refined, while others are chemically treated or modified. The treated and modified starches vary widely in their properties, depending largely upon the method and degree of treatment. Three representative starches were selected for study and dispersed in water at 190 deg. F. in a ratio of 1 part of starch to 5 parts of water. They are described as (1) a thin boiling, oxidized starch of rather high viscosity when cooled to 100 deg. F., (2) an oxidized corn starch of medium viscosity, (3) a modified corn starch of low viscosity.

The soya bean protein used was a granular material, and it is representative of a grade employed by a number of paper mills for coating and other purposes. It is readily dispersed at 160 deg. F. in a ratio of 100 parts protein to 600 parts of water containing 10 parts of soda ash.

The calcium carbonate employed is representative of a precipitated grade prepared specifically for coating paper, and it is being successfully employed by a number of mills for this purpose.

The clay employed in the investigation is representative of a grade widely used in the coated paper industry. It is believed that the results obtained with these two pigments will not be far different from what one might expect to find in actual mill practice.

The raw stock paper employed is a grade suitable for coating, and its evaluation is as follows:

Basis weight (25 x 38—500)	41.5 lb.
Bursting test	16.3
Tear (in grams):	
Machine direction	30.0
Cross direction	35.4
Thickness	.004 in.
Size test (dry indicator)	26.7 sec.
Porosity (Bekk)	27
Smoothness (Bekk)	25
Opacity	87
Brightness	81

The same raw stock was used throughout the investigation.

Preparation of Coating Colors

Pigments consisting of calcium carbonate and clay were weighed out dry and mixed with water so as to obtain slips containing 50 per cent solids and 50 per cent water. The required amount of prepared adhesive to give the desired degree of sizing was added to each of the slips. This mixture constitutes the coating color, because no aids or preserva-

tives were incorporated in the mix. The entire mixture was stirred by means of a laboratory stirrer for 45 min. before screening through a 140-mesh screen.

The screened coating was then brushed onto the raw stock to a weight of 16 lb. per 500 sheets 25 by 38 inches. The brushouts were made on a laboratory coating machine fitted with a doctor blade and micrometer gage so that all coatings could be duplicated within ± one-half pound.

The coating colors prepared were:

100% Calcium carbonate with 5 to 41 parts casein
100% Calcium carbonate with 10 to 35 parts soya bean protein
100% Calcium carbonate with 10 to 45 parts thin boiling starch
100% Calcium carbonate with 15 to 45 parts oxidized corn starch
100% Calcium carbonate with 20 to 30 parts modified corn starch
Blends of 75% calcium carbonate and 25% clay, 50% calcium carbonate and 50% clay, 25% calcium carbonate and 75% clay, with the required amount of each adhesive to impart to each of the coatings a bonding strength equivalent to a 4 to 5 Dennison wax.

All of the coated papers were dried and conditioned for a period of 24 hr. before calendering by a paper mill on a regular calendar stack.

The calendered sheets were fully evaluated according to TAPPI Standards, with the exception of the brightness, which was determined by means of a B. and L. opacimeter employing a magnesium carbonate standard white body.

Properties of the Coated Papers

The findings obtained on evaluating the calendered coated papers are presented graphically. The first section deals with 100 per cent calcium carbonate coated papers in which casein, soya bean protein, and various starches have been incorporated in the coating color in increasing amounts. The second section concerns blends of calcium carbonate and clay coated papers, in which the required amount of casein, soya bean protein, and various starches to give a Dennison wax test of 4 to 5 have been incorporated in the coating color.

Calcium Carbonate with Various Adhesives

Wax Test or Bonding Strength

The amount of each adhesive studied required to impart to calcium carbonate coatings any bonding strength between the limits of a 1 to 12 Dennison wax test is given in Fig. 1. These data (Fig. 1) may well serve as a comparison of the bonding strengths of the adhesives plotted. Casein decidedly possesses the greatest bonding strength. Therefore, a smaller amount of casein is required for any fixed wax test than any of the other adhesives. Soya bean protein is next, and the modified corn starch, oxidized corn starch, and thin boiling starch follow in the order given.

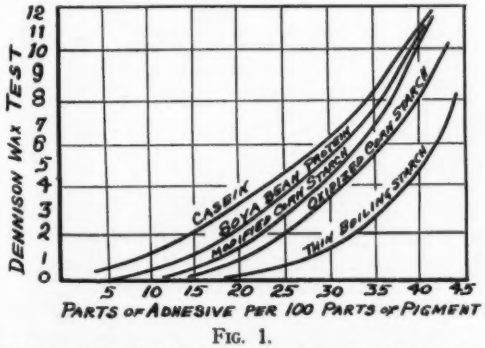

Fig. 1.
The Dennison Wax Test of $CaCO_3$ Coated Papers Sized with Different Amounts of Various Adhesives.

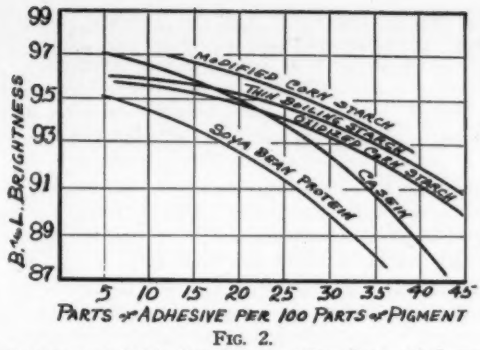

Fig. 2.
The Brightness of $CaCO_3$ Coated Papers When Sized with Increasing Amounts of Various Adhesives.

The percentage of each adhesive required to impart a bonding strength to calcium carbonate coatings equivalent to any desired wax test may be determined direct from this chart. The amount required for a 5 wax would be as follows:

Adhesive	Pigment	Amount required for a 5 wax test (parts of adhesive per 100 parts pigment)
Casein	$CaCO_3$	26
Soya bean protein	$CaCO_3$	29
Modified corn starch	$CaCO_3$	31
Oxidized corn starch	$CaCO_3$	34
Thin boiling starch	$CaCO_3$	40

Brightness

The B. and L. brightness values of 100 per cent calcium carbonate coated papers sized with increasing amounts of different adhesives are given in Fig. 2. Increased amounts of any of the adhesives cause a gradual lowering of this value. The lowering of the brightness is not so pronounced for some adhesives as it is for others. A great advantage that any adhesive may possess is the inability to lower the brightness of coated papers, when it is incorporated in the coating in appreciable amounts. Unfortunately, we have no adhesive which does not have a tendency to lower the brightness. This is

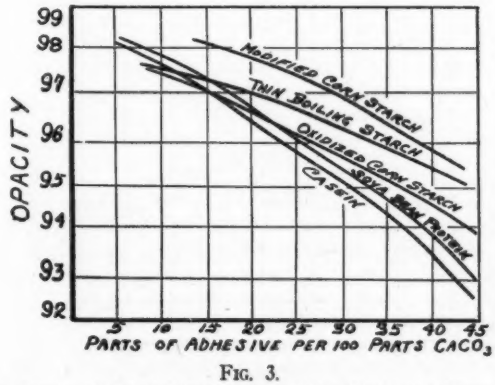

Fig. 3.
The Opacity of $CaCO_3$ Coated Papers When Sized with Increasing Amounts of Various Adhesives.

often due to the fact, that the adhesive does not possess a brightness value equal to that of the pigment, with which it is incorporated. Moreover, adhesives are partly transparent. Therefore, as the adhesive is increased in the coating, and part of the pigment is actually replaced by the adhesive, a lowering in both brightness and opacity takes place.

Starches are probably the nearest approach to a desirable adhesive from the point of retaining high brightness and opacity values, when relatively large amounts are included in the coating.

Casein and soya bean protein have a greater effect than do the starches on lowering the brightness. This property may be controlled to some extent by selecting the most desirable type of alkali and determining the required amount for a proper dispersion of these two adhesives. An excess of any alkali or prolonged heating will cause both casein and soya bean protein to become dark.

Opacity

The opacities of coated papers prepared from 100 per cent calcium carbonate with increased amounts of various adhesives are shown in Fig. 3. The curves are almost identical in nature with those shown for the brightness values. Only soya bean protein has taken a somewhat higher position, showing that it does not lower the opacity of calcium carbonate coated papers as much as casein does. Increased amounts of any of the adhesives have a tendency to lower the opacity of the coated papers.

Ink Receptivity

The ink receptivities of coated papers prepared from calcium carbonate and various adhesives are given in Fig. 4. A decided decrease in ink receptivity is realized with increased amounts of any adhesive. As the adhesive is increased, the paper becomes more resistant to ink penetration.

The starches have the least effect on the decrease of this property, especially in the ranges of higher sizing. Calcium carbonate ranks high among the paper coating pigments in ink receptivity. Therefore, it is a suitable pigment to employ in coated papers, where high wax tests are desired.

Smoothness

The final finish of coated papers is largely rated on a smoothness and gloss basis. Adequate smoothness is essential. Adhesives which have a tendency to enhance this value are worthy of consideration. We have represented the calendered smoothness values of calcium carbonate coated papers containing various amounts of the adhesives in Fig. 5. The smoothnesses of all the coated papers are within the desired range. Higher smoothness values are realized by employing the starches; the modified corn starch gives the highest value. There is a tendency toward a maximum smoothness for the papers prepared with each adhesive, i.e., as the ratio of adhesive to pigment is increased, the smoothness increases to a maximum. Beyond this point increased amounts of adhesive cause a lowering of the smoothness value.

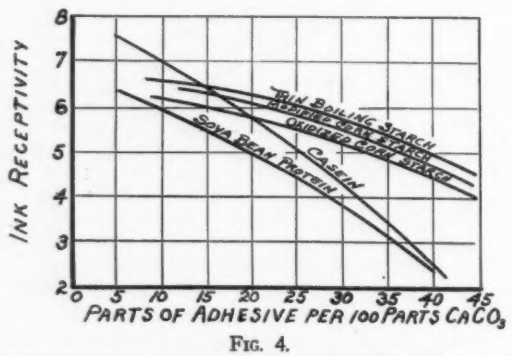

Fig. 4.

The Ink Receptivity of $CaCO_3$ Coated Papers Sized with Increasing Amounts of Various Adhesives.

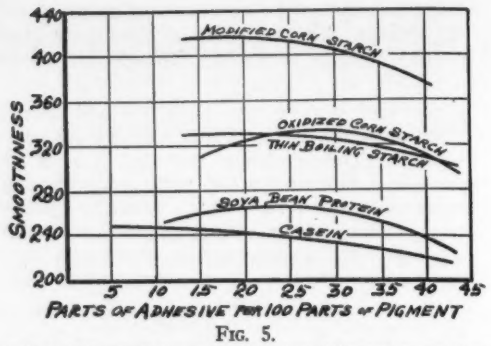

Fig. 5.

The Effect of Increased Amounts of Various Adhesives on the Smoothness of $CaCO_3$ Coated Papers.

Gloss

The gloss values of calcium carbonate coated papers prepared by employing increasing amounts of various adhesives are given in Fig. 6. The gloss definitely decreases as the amount of any of the adhesives is increased. There is, however, a decided difference in the gloss obtained with the various adhesives. The highest gloss calcium carbonate coated papers are obtained with soya bean protein. Calcium carbonate is generally classed among the dull finishing pigments. However, by employing soya bean protein, thin boiling starch, and smaller amounts of casein, desirable high gloss calcium carbonate coated papers may be obtained.

Blends of Calcium Carbonate and Clay with Various Adhesives

Adhesive Requirement

The relations pointed out in the above pertaining

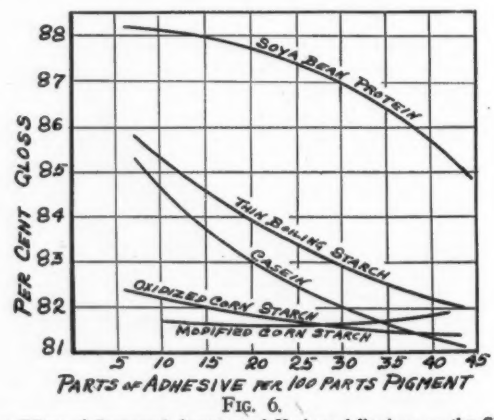

Fig. 6.

The Effect of Increased Amounts of Various Adhesives on the Gloss of $CaCO_3$ Coated Papers.

to the various adhesives with an individual pigment may serve as valuable information in predicting values and qualities of coated papers prepared from any individual pigment or a variety of blends of the various pigments. We have, however, prepared a series of blends of calcium carbonate and clay coated papers, in which we have incorporated the required amounts of various adhesives to impart to the coating a bonding strength equivalent to a Dennison wax of 4 to 5. The amount of each adhesive required for the various blends is given in Fig. 7.

The amount of each adhesive required is inversely related to its bonding strength. A smaller amount of casein is required than of any of the other adhesives. Larger amounts of the starches are required, and soya bean protein falls between casein and the starches. The required amount of each adhesive decreases as the clay content is increased in the pigment blend. The required amount of each adhesive for the blended pigments is in good agreement with the requirements shown for the individual calcium carbonate pigment.

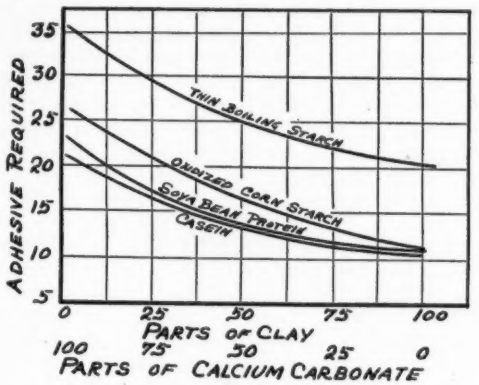

FIG. 7.

The Amounts of Different Adhesives Required by Blends of Clay and $CaCO_3$ to Pass a 4 to 5 Dennison Wax.

BRIGHTNESS

The brightness values of coated papers prepared from calcium carbonate and clay blends with various adhesives are shown in Fig. 8. The relation of the effect of the various adhesives on the brightness of the various blended pigments presents a somewhat different conception from that of the individual pigment. The relation shown in Fig. 8 is based on the required amount of each adhesive for a Dennison wax test of 4 to 5. Since the bonding strength of each adhesive controls the amount required, it is possible to use smaller amounts of an adhesive which possesses a higher bonding strength and thereby obtain a coated paper of higher brightness. This, of course, applies only to adhesives which do not have a great tendency to lower brightness values. We find, therefore, that the coated papers prepared with casein have a higher brightness by virtue of the fact that less of it may be used. The brightness is the lowest in papers prepared with boya bean protein. The starches do produce coated papers of a desirable brightness value, even when large amounts are required.

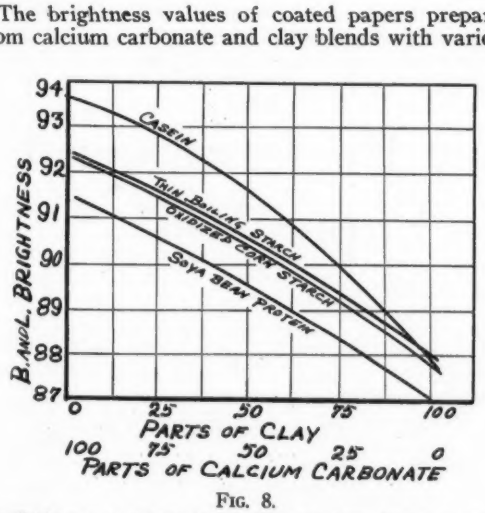

FIG. 8.

The Brightness of Coated Papers Prepared from Blends of $CaCO_3$ and Clay and Sized with Various Adhesives to a Dennison Wax Test of 4 to 5.

Regardless of the adhesive used, the blends containing higher amounts of calcium carbonate produce papers which have a higher brightness. Since all of the coatings are sized to the same wax pick, the findings are to be considered as a representative evaluation of the brightening effect which calcium carbonate has upon clay when blended with it in various proportions.

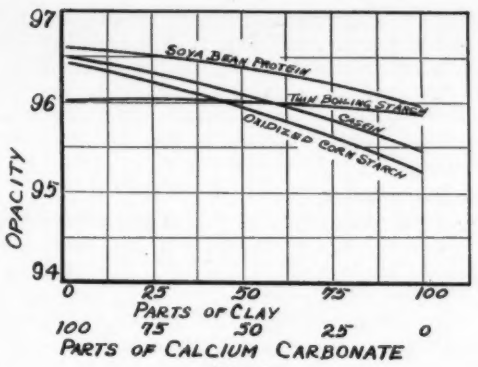

FIG. 9.

The Opacity of Coated Papers Prepared from Blends of $CaCO_3$ and Clay and Sized with Various Adhesives to a Wax Test of 4 to 5.

OPACITY

The opacities of the papers prepared from blends

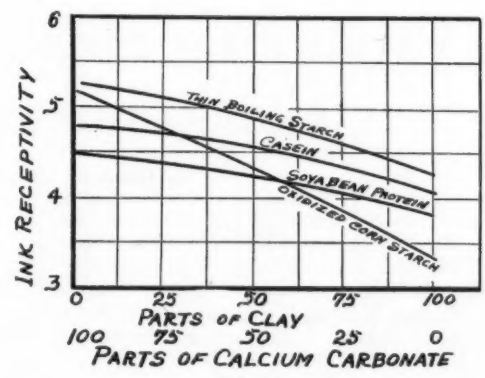

FIG. 10.

The Ink Receptivity of Coated Papers Prepared from Blends of $CaCO_3$ and Clay When Sized with Various Adhesives to a Dennison Wax Test of 4 to 5.

of calcium carbonate and clay by employing various adhesives are given in Fig. 9. Since the amount of each adhesive has been adjusted so that all of the coatings just pass a 4 to 5 wax test, the opacity remains almost the same throughout the range. There is a small drop in opacity as the clay ratio of the pigment blend is increased.

Ink Receptivity

The ink receptivities of the papers prepared from blends of calcium carbonate and clay with various adhesives are shown in Fig. 10. The thin boiling starch and casein sized papers are more receptive to ink. The gradual decrease in ink receptivity of the coatings containing higher amounts of clay is due to the clay in the blend and not to oversizing with either of the adhesives.

Smoothness

The smoothness values of the coated papers prepared from blends of calcium carbonate and clay are controlled more by the adhesive incorporated in the coating than by the ratio of either pigment to the other. The papers containing starches as the adhesive possess high calendered smoothness values, and this is in agreement with the findings for calcium carbonate coated papers. This relation is shown in Fig. 11.

Gloss

The gloss of coated papers prepared from blends of calcium carbonate and clay may be controlled by the adhesive employed as well as by varying the amounts of clay or calcium carbonate composing the pigment. The starches do not produce coated papers with as high a gloss as those made with casein and soya bean protein. There is very little difference between the finish properties of coated papers prepared from blends of clay and calcium carbonate, when either casein or soya bean protein is used. The gloss values for the coated papers prepared by employing the various adhesives are given in Fig. 12.

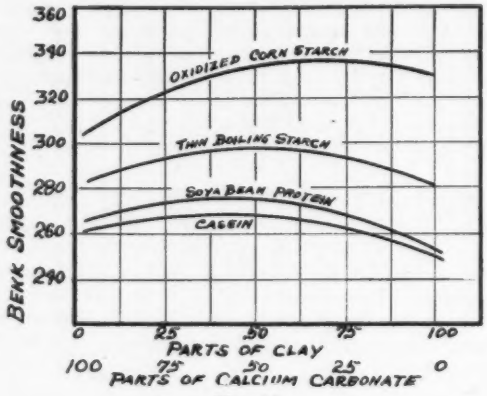

Fig. 11.

The Smoothness of Coated Papers Prepared from Blends of $CaCO_3$ and Clay When Sized with Various Adhesives to a Wax Test of 4 to 5.

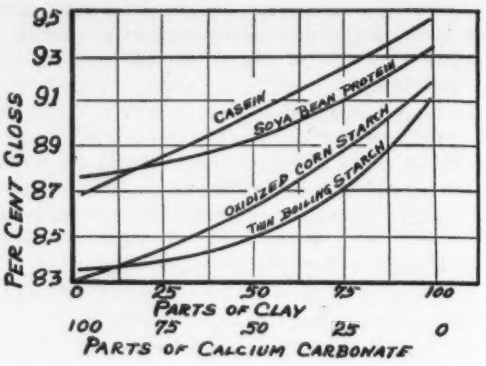

Fig. 12.

The Gloss of Coated Papers Prepared from Blends of $CaCO_3$ and Clay When Sized with Various Adhesives to a Wax Test of 4 to 5.

Conclusions

Some adhesives are more suitable for certain purposes than others. To devote time to the specific use of each adhesive would not be in keeping with the purpose of this paper. However, since five different adhesives have been studied with both calcium carbonate and blends of calcium carbonate and clay, the findings reported herein may well serve as a comparison of the adhesives listed for the specific purpose of coating paper with calcium carbonate and clay. The comparison naturally resolves itself into a rating of the adhesives studied, so that under specific conditions certain adhesives may be selected as being the best or more desirable for the intended purpose.

It is to be concluded that all of the adhesives reported on at this time are suitable for the brush coating of paper, and that they work equally as well with calcium carbonate and blends of calcium carbonate and clay as they do with clay alone.

Promoting Satisfactory Bacteriological Conditions in the Paper Mill*

By Robert F. Huntley[1] and R. Hamilton Torrey[2]

Abstract

Mills manufacturing paper and paperboard for use in the packaging of moist perishable foods have within the last few years been confronted with a new problem, that of controlling the bacterial condition of the product, and in a few instances even making the paper to comply with definite specifications of bacterial count.

The purpose of this paper is simply to set up an outline of methods and controls which have been found by certain mills to enable them to produce a paper with a low bacterial count which is satisfactory to the public health authorities for use in milk containers. It will be easily recognized that each mill presents a specific problem, but we believe that if

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[2] Riegel Paper Corporation.

these general practices are set up in any mill and specifically applied to the conditions existing in that mill, they will be helpful in producing a paper giving a low bacterial count.

In the establishment of new production practices, it is first necessary to have some means of recognizing present weaknesses and measuring accomplishments. In bacteriological work this requires the attention of a trained person with adequate equipment. There are some mills that already have completely equipped bacteriological laboratories with trained personnel. Other mills have equipped the chemical laboratory for this work, and the chemist has had to assume additional responsibility,—still others have called upon bacteriologists with the facilities of a laboratory to do this work for them. Whatever the procedure, it is quite necessary to have a laboratory within a reasonable distance of the mill to make the required tests. Most bacteriological laboratory procedures are of long standing. Others have recently been developed for the study of paper and paper products. Testing methods are rapidly being evalued which may some day be standard in our industry.

This subject will have to be treated very generally inasmuch as the water supplies at mills vary greatly. Some mills obtain their water from artesian wells, which water may meet the public health standards for drinking water without any treatment. Some mills draw their water from relatively unpolluted streams, while other mills have their water supply from heavily polluted streams. Another problem in water supplies which presents itself is whether the water is clear or muddy. Practically all mills which rely on a stream for their source of water supply are troubled more or less by turbidity of the water. This, of course, is not a constant condition, but varies greatly with the weather conditions and due to this, the method of treatment must be flexible.

A commonly used method for settling the suspended matter from the water is the use of lime or acid and alum for coagulation and passing the water through a settling basin. While this method is very effective in settling out the suspended matter, it does not particularly help the bacterial count of the water unless the water happens to have a very high bacterial count, then the settling with lime and alum has been found to materially reduce the bacterial count. The amount of lime and alum to be used presents a specific problem for each mill to determine. Naturally, as the turbidity of the water varies, treatment should be varied accordingly.

Chlorination

The chloramine process has been found very effective in reducing the bacterial count of the water. Some mills add the chlorine and ammonia before the settling process, others before the water passes through the filter beds as they have found the water having a residual of chlorine before entering the filter beds tends to keep the sand in the filter beds clean and sharp and allows the filter beds to operate efficiently. It appears that chlorination is the cheapest and most effective method known of producing water with a very low bacterial count. Chlorine has another advantage inasmuch as it does not leave any toxic residual in the water itself.

It has been found very effective to add enough chlorine and ammonia so that the filter water used in the mill will contain a chlorine residual of from 0.3 to 0.5 parts per million. If a slight chlorine residual is present in the white water leaving the machine and the contact time has been sufficient, it shows that the chlorine demand has been met. The laboratory test for bacterial count is the proper means of controlling the application of chloramine. If the counts are kept low, the chlorination is effective. If counts go up, chlorination is not effective regardless of chlorine residuals.

Raw Materials or Ingredients Used in Paper

Due to the process, it is assumed that chemical slush pulp coming out of the digester is practically sterile due to the heat and chemicals used in the process, and therefore it becomes necessary to see that the pulp does not become contaminated. Hence, wash water, pipe lines, and chests should be kept in condition that will not allow the pulp to become contaminated or inoculated with bacteria.

Groundwood

Due to the high temperature developed at the wood stone interface, groundwood pulp at this point approaches sterility. The stone shows water should carry a relatively high chlorine residual as should all dilution and shower water. White water for dilution purposes should not be allowed to stand in the tank over any appreciable shutdown period. The same is true of the slush pulp. Pipe lines, screens, chests, vats, etc., should be kept clean. This cleaning procedure cannot be overemphasized. The system should be gone over thoroughly at least once a day. Equipment should preferably be constructed of metals which will resist corrosion and the accumulation of any slime. Slush storage chests should be so constructed that there is proper agitation with no dead spots for pulp to remain for appreciable time intervals. Vitreous tile linings in chests have been found to help due to the hard nonporous surface and ease of cleaning. Control of *p*H is important and if carefully studied will be effective in maintaining exceedingly low bacterial counts.

Lap Pulp

Lap pulp should be stored in a dry clean place. In making a low bacterial count paper, the wrappers on the lap pulp should not be used, as they have had every opportunity to become contaminated in shipping and handling.

Starch

Starch is a material which some mills have found to vary greatly in bacterial count. To produce a low bacterial count paper, low bacterial count starch should be used to produce the best results. The special chlorinated starch seems to be best in this respect. However, this can easily become inoculated and bacteriological samples should be taken frequently. In cooking up starch it has been found beneficial to add bleach liquor or chlorine to the cooking water to, say, a residual of 100 parts per million. Starch should be used quickly and made up frequently as the temperature of the cooling starch is such that thermophilic organisms thrive and multiply very rapidly.

Alum and size offer practically no bacteriological problems,—although size emulsions may contribute high counts unless care is taken to keep the emulsion storage tanks clean. Some of the prepared foam killers may offer bacteriological problems and should be studied.

Mill System

It is essential that beaters, chests, and pipe lines

be kept thoroughly clean. Before starting up on a run of paper which must have a very low bacterial count, some mills have found it advisable and very effective to run a 1½ per cent hot solution of NaOH through the lines and chests. Another method of sterilizing the system is to pump water having a residual of, say, 1,000 p.p.m. of chlorine through the system. This may be allowed to stand in the beaters, chests, and pipe lines for several hours if it is done over a week end. The piping system should be studied with the idea of eliminating all dead ends and all possible sharp angles.

Piping Materials

Copper piping is favored by some mills. The initial cost of this is high, but it offers a smooth interior surface free from depressions and cracks at the joints in which pulp may lodge. It has been said that in itself it offers some bactericidal properties.

Other mills get very satisfactory results from cast iron pipes with concrete lining, but it is of the greatest importance that the system be kept just as clean as possible. The mill water having a residual chlorine content is, of course, tremendously helpful.

In beating machine broke and machine trim, it has been found helpful to use a high residual of chlorine in the beater in this operation, as the trim and broke has an opportunity to become contaminated in handling.

If the water in the broke beater is heated to facilitate the disintegration of the broke and the beater is emptied into the broke chests at a temperature of 120 deg. F. or more, the count of thermophilic organisms in the chest tends to multiply very rapidly, as this temperature is ideal for the growth of thermophilic organisms. This condition should be avoided, if possible.

Just before a broke beater is dumped into a chest to be held for any length of time, it has been found effective to add alum to lower the *p*H of the rebeaten stock in the chest. When the stock is kept at *p*H 5.0 or below in the chest, it has been found this is effective in keeping the bacterial count down and preventing a build-up as the run progresses.

It has also been found that the bacterial count of the stock in the beater is usually lowered after the addition of alum and the size to the beater. This lowering is undoubtedly caused by the lowering of the *p*H of the stock by the addition of alum.

White Water

The individual white water system should be studied carefully, and as the mill practices vary so greatly in this respect, it is not possible to be specific about this problem, but it is known that white water can cause a great many bacteriological troubles and problems, which can be greatly simplified if it is so treated that the white water system carries a small residual of chlorine. By a small residual, we mean as low as .05 p.p.m.

Another item of interest is that the bacterial count can be kept lower in a system of which the stock has a *p*H value of 5.0 or less, than one in which the *p*H is up around 7.0. Theoretically, the same effect can be obtained with high alkaline values, as bacteria ordinarily function most effectively at about the neutral point. However, we cannot speak from experience about high alkaline values.

Of course, the drying operation is one of the most effective sterilizers that could possibly be devised, as due to the temperature at which the driers operate, most of the bacteria will be killed in this operation.

If the paper is water finished, the water in the water boxes on the calender stacks should be as nearly sterile as possible, and also carry a residual of chlorine because bad water at this point can offset to a large degree the effective work that the driers have done in eliminating bacteria.

Handling the Paper and Plant Cleanliness

Great care should be taken in handling the rolls when they are taken from the reel. The machine help should have clean hands and also handle the paper as little as possible. The rolls themselves should be carefully wrapped as soon as possible and stored in a clean dry place.

In the production of low bacterial count paper good housekeeping is a very important consideration, not only from the actual contribution of contamination, but from the psychological effect on employees. A good starting point in cleaning up is to assume that "anything out of place is dirt." Get the plant in order, then spread on light colored paint on the building as well as equipment. This will eliminate dark corners which have been filled for months with odd items just put there for a day or two. If the floor surfaces are rough and broken, these should be repaired so that they can be kept clean. Splatter of stock should be kept down by baffles and proper design of equipment. Employees should be informed of the program, the reasons for it, and their part in it. With proper handling they will develop a pride in keeping their department clean. Mill committees such as are sometimes used in controlling safety are effective. Good housekeeping gains momentum as it goes. One corrected condition uncovers another spot needing attention. Good housekeeping not only improves paper quality, but provides better working conditions.

Bacteriological Surveys

Periodic surveys should be made to determine the bacteriological status of the mill system as a whole, and also the individual components of the system.

If the bacterial count on the finished paper is low, this is more or less a matter of routine. Generally speaking, samples of the water should be taken progressively as it flows through the mill piping system, and the stock should also be followed from the beater progressively through to the machine. If this is done, it becomes possible to localize the source of contamination which may be confined to a relatively small area. In such cases, it can easily be taken care of by the methods which we have outlined under the mill system.

For a complete survey of a mill, we would suggest the following, which any mill could modify to suit the particular conditions:

1. Raw water
2. Coagulated water
3. Water after chlorination and filtering, which is the process water used in the mill.
4. Pulp
5. Beater
6. Stock and broke beater
7. Pulp in the chests
8. Broke in the chests
9. Stock from headboxes
10. In case of cylinder machine, stock from vats
11. White water
12. Wet trim
13. Water in calender waterbox
14. Finished paper

Samples taken from the above points should give a clear picture as to how the stock was progressing through the system, and if any bacteriological build-up is occurring, these data should show very clearly in what specific areas it is occurring.

Retention of Fillers*

By S. W. Martin[1] and W. R. Willets[2]

Abstract

The differences of opinion regarding the mechanism of retention, as shown by a literature review, have led to an analysis of considerable experimental data obtained over the past few years in an attempt to secure a better understanding of the phenomenon.

It is shown that in a system where only filler and fiber are present, there can be no colloidal attraction because both constituents are negatively charged. In such cases retention is a simple mechanical filtration and will be governed by the weight of the fiber mat, size of the interstices of such a network, etc.

Alum has a great effect in improving retention because of its hydrolysis to positively charged alumina which is adsorbed on the negatively charged fibers and acts as an electrostatic cement for the filler.

The addition of sulphuric acid lowers the amount of alumina adsorbed by reversing the reaction to soluble aluminum sulphate. In spite of the fact that this aluminum sulphate can ionize and thereby exert its flocculating action, retention is impaired to the point of mechanical filtration. Flocculating effects can not be discounted completely as the addition of magnesium sulphate increases the retention of filler somewhat.

Rosin, which is known to have a definite particle size and to be a negatively charged colloid, has little effect on the retention of fillers. Apparently alum acts on rosin in much the same manner as it does on filler.

The addition of alkali in the form of sodium carbonate results in decreased retention probably because the electropositive nature of the alumina is affected by an adsorption of hydroxyl ions.

The addition of sodium aluminate increases the amount of alumina retained by the sheet but does not aid retention, leading to the observation that alumina produced by the action of sodium aluminate on alum does not have the same electropositive characteristics as that produced by the hydrolysis of alum alone.

Synthetic alumina is fairly well retained in the sheet but does not give rise to improved retention. Apparently there are two types of alumina; the first is an electropositive alumina resulting from the hydrolysis of alum with a high adsorption capacity for the fiber; the other type, which has different colloidal properties, is retained mechanically by the network of fibers and has little or no effect on retention primarily because of the nature of its interface.

Since starch is a negative colloid and is not adsorbed to any great extent by paper fibers, it does not have any beneficial effect on retention. In fact, there may exist between the starch and the fiber a competitive selectivity for alumina, which acts as an inhibitor for the cementation of the filler on the fiber.

The effect of more dilute stock and higher temperatures in increasing retention can be explained on the basis of colloidal phenomena. The hydration of stock with its increase of fiber surface is shown to have a colloidal effect as well as a mechanical effect.

The mechanism of the retention of fillers has received considerable attention in recent years, probably because of the increased usage of more expensive materials such as opaque pigments. The theories advanced to explain this mechanism may be classified under two general headings; retention by purely mechanical filtration, and retention by virtue of colloidal phenomena.

Review of Retention Mechanism Theories

A brief survey of the literature bears out the fact that there is considerable difference of opinion regarding the mechanism of retention, and even in the empirical effect of varying different factors *(41)*. Such inconsistencies may be readily explained by the complexity of the cellulose fiber itself, to say nothing of the other materials which may enter into the system: size, starch, filler, dyestuffs, alum, etc.

Rue, et al. *(25, 26)* stated that the retention of clay, when no size or alum was used, was apparently a result of a combination of mechanical filtration and colloidal adsorption. When alum was added the retention increased considerably and this was explained on the basis that the alum exhibited a flocculating effect on colloidal matter. However, the effect of adsorption was considered relatively unimportant compared to the filtration action of the pulp. In general this work was confirmed by Kress and McNaughton *(15)*.

DeCew *(6)* noted the influence of colloidal factors on the retention of size and fillers in stating that a colloidal filler gave the best results if used in conjunction with the coagulants employed for sizing paper. Darrah *(4)* proposed that the subject of fillers was closely connected with colloid chemistry. He concluded that the sign of the charge carried by the particles was important in controlling their retention, and that the best fillers for paper usually have a charge opposite in sign to that of the cellulose fibers. This condition causes the filler to adhere more firmly and to be most uniformly distributed.

However, Boussu *(2)* claimed that the fixation of the ordinary paper fillers was not a physico-chemical phenomenon as was sizing. Instead, the filler particles were merely held between the fibers by a filtration process. He added that soluble starch might improve retention by coating the filler particles and thus cement them to the fiber.

Roschier *(22)* noted that clay was electronegative and the hydroxyl ions from the size emulsion increased the charge and improved the dispersion which made the clay mix more readily with the fibers because of an increase in the contact surfaces. He stated that most of the filler was held on the fibers by purely mechanical action and that alum had some influence. It might also be thought that the ions from aluminum sulphate were adsorbed on, and consequently imparted a positive charge to the fibers, which would be more apt to attract and hold the negatively charged clay particles. Finally, since the

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[2] Member TAPPI, Paper Development Laboratory, Titanium Pigment Corp., New York, N. Y.

ability of the fiber to adsorb aluminum ions was limited, the addition of alum above a given limit had no further effect on filler retention.

Atsuki and Nakamura *(1)* believed that retention was explained only as occlusion of clay by the sheet, because both the clay and fiber were negatively charged and so surface adsorption could be only an insignificant factor.

Lorenz, et al. *(16)* maintained that retention was a result of mechanical filtration which depended on the size of the meshes of the fiber network and also of the binding of fillers to fibers by adsorption or cementing precipitations. In accordance with the electrostatic theory of sizing, alum was considered to act in the same way on negatively charged fillers and size.

Strachan *(31, 32)* stated that in papermaking one of the important factors was the precipitation of positively charged aluminum hydrates in a mass containing several negatively charged colloids, including cellulose, clay, rosin, starch, etc., which resulted in the mutual coagulation of a complex containing loading, sizing and color on the cellulose surface. He believed however that the retention of loading material was also a matter of mechanical filtration in the spaces between the fibers. A well hydrated stock, which had a higher adsorption capacity, was observed to give smaller interstices. This resulted in a higher degree of filler retention than was obtainable with free stock. Khinchin *(13)* and Stschegloff *(33)* subscribed to the colloidal theory of retention. The former stated that as retention was colloidal in nature, it favored kaolin particles from colloidal size to 5 microns, and depended on the order of addition, *p*H, and adsorptive capacity of the fibers. The latter reaffirmed this, especially for small particle size fillers, in adding that the retention of fillers by paper pulp with the help of chemicals was not the result of mechanical filtration but of colloidal chemical processes.

Haslam and Steele *(8)* proposed that there were three possible mechanisms for the retention of fillers: mechanical filtration, coflocculation, and mechanical attachment. They defined filtration as being responsible for the retention of any pigment remaining in the web simply because it failed to find an opening to pass through. Coflocculation was described as an attachment of particles to the fiber walls because of interfacial forces analogous to those causing ordinary flocculation. By mechanical attachment they meant the binding of particles to the fiber because of nonflocculating forces, such as the wedging of a particle into an imperfection in the fiber surface or the imbedding of a particle in a layer of plastic material which might be on the fiber wall.

Rowland *(24)* noted the importance of colloidal conditions in the retention of fillers, etc., and stated that such constituents may be held on the fibers through the processes of surface adsorption involving surface energy, electrostatics, flocculation, and filtering action during sheet formation.

Hauser *(9)* recognized the importance of alum by stating that the positively charged aluminum ions of the dissociated aluminum sulphate solutions were deposited on the negatively charged fibers resulting in the precipitation of negatively charged rosin, filler, etc., on the fiber.

Brecht and Rausch *(3)* concluded that physical chemical influences played a large part in the adsorption and occlusion processes giving greater filler retention, as compared to the relatively small increase resulting from purely mechanical influences. They believed that chemical means offered the best method of filler retention, and that mechanical treatment of the stock had comparatively little effect. Experiments were performed with a flocculating medium (processed glue) and it was found that retention was increased considerably.

Saeki and Suzuki *(27)* held more closely to the mechanical theory of retention and stated that chemical or colloidal factors were of importance only with small particle fillers such as titanium pigments.

Miller *(19)* felt that the formation of a floc was of importance because alum was used to improve the retention of fillers and in this capacity the floc was the active agent. However, he noted that other mechanisms, such as the mutual entrainment of both filler and fiber by the alum floc, adsorption of the alumina in one form or another upon the fiber, etc., were not excluded by this theory and might also play a part.

While the above review does not claim to be a complete digest of the literature regarding the theory of retention, it does serve to illustrate the many different postulations which have been advanced to explain the phenomenon. Undoubtedly mechanical retention by means of filtration is an important factor. Flocculation may also play some part although experiments to be noted subsequently will illustrate that to a great extent its influence can be minimized. The electrostatic cementing theory is becoming more widely accepted, but here especially there has been considerable difference of opinion concerning the exact mechanism.

These existing differences of opinion have led us to investigate a large amount of experimental data accumulated in our laboratories over the past few years. Although none of the experimental work was originally done in an effort to derive a theory of the mechanism of retention, it became evident from a review that a close study could lead to a better understanding of the subject.

The Filtration Mechanism

The simplest system, which lends itself most readily for analysis, consists of cellulose fiber and filler. In such a system, Willets *(41)* has found that when 7.5 per cent titanium dioxide was added, only 17.9 per cent of the total was retained in the formation of paper from a domestic bleached sulphite by means of a laboratory technique. Roschier *(22)* using different technique had previously reported a retention value of 32 per cent when 10 per cent clay filler was added on a fiber-weight basis. These results can be interpreted in terms of known colloidal properties of cellulose and fillers.

Any solid in contact with a liquid assumes an electrical charge with respect to the liquid as a result of selective adsorption of ions. This adsorption sets up an electrokinetic potential between the adsorbed ions and the bulk of the solution. Stamm *(30)*, in a review of the colloid chemistry of cellulosic materials, presents the evidence for the generally accepted fact that cellulose, as well as other fibrous materials, has a negative potential with respect to water. Likewise, most fillers acquire electronegative charges at the solid-liquid interface when dispersed in aqueous solutions. Mattson *(18)* has investigated the electrokinetic properties of electrodialysed Sharkey clay for which a mobility of 3.20 microns per sec. per v. per cm. or its equivalent potential of —45.0 millivolts was

measured. Some preliminary work on titanium dioxide water dispersions has given values of the same sign and magnitude as those cited for clay.

The next factor to be considered is that of particle size. A method for the determination of particle size distribution as well as typical results for various titanium dioxide dispersions has been described by Martin *(17)*. On a weight basis the bulk of titanium dioxide pigment can be assigned an average aggregate diameter of 0.3 micron. Norton and Speil *(21)* have studied several types of clays and evaluated their particle size distributions, which are at least in order of magnitude not different from that of titanium dioxide.

The results obtained when the fiber-filler furnish was dumped on the screen can be attributed entirely to a filtration effect, in which a certain percentage of the total filler was mechanically trapped. But because of the colloidal dimensions of the particles and the electronegativity of both filler and fibers, most of the pigment passed through the interstices of the fiber mat. The object of retention studies is to minimize the loss of filler, and as proposed in the literature, this can be accomplished by (1) flocculation of the pigment particles, with a corresponding increase in size so as to improve the filtration capacity of the mat, and (2) electrokinetic cementation, in which the cellulose is made electropositive through preferential adsorption. The above points hold for a given type of fiber and degree of fiber preparation, since a change in the size of the interstices would obviously have an effect.

The Colloidal Aspects of Retention

The Effect of Alum

In view of the conclusion, "alum is the most important factor in securing good retention" *(41)*, it appears logical to evaluate its role in retention phenomena.

The effect of alum, when used without rosin size, on the retention of titanium dioxide and clay has been studied under widely varying conditions of experimental technique. Table I gives data for a beater processed pulp, Table II for a pebble mill processed pulp.

In an effort to interpret the data of the above two tables, it will be necessary to discuss briefly the fundamental chemistry of alum.

Weiser *(38)* has suggested the following mechanism as typical of the hydrolysis of aluminum salts:

$$Al_2(SO_4)_3 + XH_2O \rightleftarrows Al_2O_3 \cdot XH_2O + 3H_2SO_4$$

$$2Al + 3(SO_4) \qquad \text{Electropositive hydrous alumina} \qquad 6H + 3(SO_4)$$

Confirmatory evidence *(5)* for the above is found in the titration of aluminum sulphate with caustic, and in a more recent review *(39)* Weiser and Milligan have reaffirmed the constitution of colloidal systems of the hydrous oxides of aluminum. The equation for hydrolysis of alum is generally accepted although variations have been proposed *(36)*.

TABLE I.—EFFECT OF ALUM ON THE RETENTION OF TITANIUM DIOXIDE WHEN NO ROSIN USED

$Al_2(SO_4)_3.18H_2O$ Per cent	Al_2O_3 added, Per cent	pH at at Sheet machine	Ash of blank, Per cent	Experimental ash increment due to Al_2O_3	Retention titanium dioxide, Per cent
0	0.0	7.0	0.42	0.0	17.9
1	0.15	6.5	0.53	0.11	30.0
2	0.31	6.0	0.78	0.36	61.3
3	0.46	5.4	0.86	0.44	68.0
4	0.62	5.0	0.92	0.50	65.4

Notes:
1. See Table 1-B of op. cit. *(41)* for details and technique.
2. "Experimental ash increment due to Al_2O_3" was obtained by subtracting 0.42 per cent from the value of "Percent Ash of blank".

TABLE II.—EFFECT OF ALUM ON THE RETENTION OF TITANIUM DIOXIDE AND CLAY WHEN NO ROSIN USED.

$Al_2(SO_4)_3.18H_2O$ per cent	Al_2O_3 added, per cent	pH at sheet machine	Ash of blank, per cent	Experimental ash increment due to Al_2O_3	Added Al_2O_3 adsorbed, per cent	Retention titanium dioxide, per cent	Retention clay, per cent
0	0.0	7.0	1.00	0.0	0.00	7.0	12.1
1	0.15	6.7	1.16	0.16	100	11.6	14.3
2	0.31	6.2	1.35	0.35	100	51.2	43.2
3	0.46	5.8	1.42	0.42	92	55.5	54.0
4	0.62	5.4	1.57	0.57	92	54.2	48.2
5	0.78	4.9	1.59	0.59	75	55.5	50.2
6	0.92	4.8	1.49	0.49	53	54.8	47.5
7	1.07	4.7	1.48	0.48	45	49.1	43.6

Notes:
1. See op. cit. *(40)* for the experimental technique
2. 5 per cent titanium dioxide or clay added on basis of moisture-free fiber
3. Average basis weight (25x38—500) = 50 lb.

The theory of alum hydrolysis is substantiated by the data given in Tables I and II. In Table I the experimental ash increment resulting from alumina is almost the same as the actual amount of alumina added so it may be assumed that the alum hydrolysed almost completely, and that within experimental limits all the alumina was adsorbed.

In Table II it will also be noted that for a 1 to 4 per cent addition of alum, practically all the theoretical alumina added was adsorbed. The addition of succeeding increments of alum with a reduction in *p*H decreased the proportion of alumina adsorbed until at 7 per cent alum, less than half of the theoretical alumina was adsorbed.

The retention of both titanium dioxide and clay increased, with the maximum retention being obtained at around 3 per cent alum addition at *p*H ranges roughly between 5 and 6.

The above experimental data are in accord with the theoretical considerations of the aluminum sulphate hydrolysis reaction. Since it is an equilibrium phenomenon, it is evident that certain factors will govern the direction of the reaction. There must be a definite minimum of aluminum sulphate to cause the reaction to proceed in a measurable time. With increased alum concentrations the equilibrium should proceed to the right with a greater production of hydrous alumina and sulphuric acid, the latter being evidenced by lower *p*H values *(38)*. Below a *p*H of about 4, the equilibrium is displaced at the expense of the alumina *(19)*. As indicated, the formation of large amounts of sulphuric acid should repress alumina formation, and this is evidenced by the experimental data of the tables. Another factor that would influence alumina formation is the removal of hydrous alumina by adsorption on to the cellulose fiber *(38)*. This fact, although questioned *(37)* has been demonstrated by a number of investigators *(11, 14, 20, 29, 34)* and is reaffirmed by the experimental data of Tables I and II.

The preceding considerations substantiate the claim that the deposition of positively charged alumina on negatively charged cellulose so alters the fiber as to make it attract negatively charged fillers, and when the concentration of aluminum sulphate is increased to the point where the *p*H is lowered excessively, the deposition of positively charged alumina is inhibited and a decrease in retention results.

A logical extension of the aforementioned would lead to the simple addition of sulphuric acid as such to an optimum equilibrium condition with respect to alumina formation and adsorption. Data obtained in this manner are given in Table III.

TABLE III.—EFFECT OF ADDING ALUM AND ACID ON RETENTION

H_2SO_4 added in sheet machine, p.p.m.	pH at sheet machine	Experimental ash increment due to Al_2O_3	Al_2O_3 adsorbed of total, per cent	Retention titanium dioxide, per cent
0	5.8	0.42	92	55.5
24	5.2	0.34	74	46.1
72	4.6	0.07	15	15.0
144	4.1	0.04	9	9.5
240	3.8	0.0	0	11.1

Notes:
1. 3% alum ($\simeq$ 0.46% Al_2O_3) added in all cases
2. 5% titanium dioxide added
3. Beating technique same as for Table II

It will be seen that the addition of sulphuric acid lowered the percentage of alumina adsorbed until a point was reached, where no alumina was in evidence in the ash of the sheet. Actually what probably happened was that the reaction was reversed by the acid to the formation of soluble aluminum sulphate. In spite of the fact that the aluminum sulphate could ionize and thereby exert its flocculating action, enhanced by high acidity, retention was impaired to the point of pure simple mechanical filtration. The above experiments reaffirm the hydrolysis theory of alum and also show the interrelation of the theory with actual retention results. All the evidence tends to show that the deposition of positive alumina on the fiber is of fundamental importance in the retention of fillers.

Nevertheless flocculating effects can not be discounted completely. Inasmuch as magnesium sulphate is well known as an effective flocculating agent for titanium suspensions, it was decided to study its action under actual beater conditions. The conditions approximate most closely those of Table I.

TABLE IV—EFFECT OF MAGNESIUM SULPHATE ON RETENTION

$MgSO_4 . 7H_2O$ $\simeq$ MgO added, per cent	Ash of blank, per cent	Retention titanium dioxide, per cent
0.0	0.27	21.4
0.08	0.24	23.7
0.16	0.25	28.9
0.33	0.21	31.2
0.49	0.22	40.1

Notes:
1. Experimental technique same as for Table I
2. Beating degree 410 cc. Schopper Riegler
3. Basis weight 46 lb. (25x38—500)
4. 5 per cent titanium dioxide used.

It will be observed that the ash of the blank sheets did not increase or vary beyond the limits of experimental error. In other words, there was no deposition of a magnesium compound on the sheet analogous to that of alumina. With increasing amounts of magnesium sulphate the retention improved, but to nowhere near the extent resulting from the use of alum, as shown in Table I. It may be concluded that flocculating effects due to aluminum ions would not be any greater than those resulting from magnesium ions, and retention is therefore far more dependent on the cementation mechanism accompanying the hydrolysis of alum.

TABLE V.—EFFECT OF ROSIN ON RETENTION

$Al_2SO_4 . 18H_2O$ added, per cent	Ash of Blank: No rosin added, per cent	Ash of Blank: 2 per cent rosin added, per cent	Incremental ash due to rosin, per cent
1	0.53	0.66	0.13
2	0.78	0.89	0.11
3	0.86	0.98	0.12
4	0.92	1.04	0.12

Notes:
1. For details see Table 1-A op. cit. (*41*)
2. Experimental technique same as for Table I
3. 7.5 per cent titanium dioxide used in all cases

Effect of Rosin

It has already been shown that rosin has comparatively little effect on retention *(41)*. The procedure used in securing the data of Table I was repeated with the addition of a constant amount, 2 per cent of rosin, Table V.

It will be seen that the incremental ash resulting from the use of rosin was not only small, but virtually constant, regardless of the amount of alum added. This leads to the indication that the hydrolysis of alum and its adsorption upon the fiber proceeds independently of the rosin size and thus is in accord with the negligible influence of rosin on pigment retention.

Rosin has a definite particle size, and its effect on the degree of sizing has been demonstrated by Dennett and Libby *(7)*. In a theory of the size mechanism, Kanamaru *(12)* has discussed the colloidal nature and reactions of rosin size. The mechanism proposed for sizing is in conformity with the conclusions arrived at in pigment retention. (Sutermeister *(35)* has made a complete literature survey of rosin sizing.)

Effect of Increased Alkalinity

It might be assumed that certain agents such as sodium carbonate, sodium silicate, and sodium aluminate, which are alkaline in nature, might have some beneficial effect on pigment retention.

An experimental evaluation of sodium carbonate is given in Table VI.

TABLE VI.—EFFECT OF ADDING SODIUM CARBONATE TO PAPER SIZED WITH 2 PER CENT ROSIN AND 3 PER CENT ALUM

Na_2CO_3 added, per cent	pH at sheet machine	Experimental ash increment due to Al_2O_3	Added Al_2O_3 adsorbed, per cent	Retention titanium dioxide, per cent
0.0	5.8	0.46	100	58.9
0.25	6.0	0.46	100	57.8
0.5	6.3	0.46	100	56.2
1.0	6.6	0.35	76	37.7
1.5	6.7	0.29	63	25.3
2.0	6.8	0.25	54	24.5
4.0	7.2	0.0	0	13.4
6.0	7.8	0.0	0	13.3

Notes:
1. Experimental technique same as for Table II.
2. 6 per cent titanium dioxide added based on fiber.

The effect of sodium carbonate was to neutralize the sulphuric acid that resulted from the hydrolysis of alum and thus raise the *p*H value. Although the quantity of alumina precipitated would remain about the same, as the *p*H rose, it might be anticipated that the electropositive nature of the alumina would be affected by an adsorption of hydroxyl ions. Evidence of this is found in: "Alumina is an electrical ampholyte and its maximum activity as a positive sol appears to coincide with a *p*H of about 5.2. On the alkaline side the normal $Al(OH)_3$ is formed and this material is in slightest excess of alkali, itself electronegative" *(18)*.

The data of Table VI indicate that up to 0.5 per cent sodium carbonate addition, the percentage of the alumina adsorbed was practically complete, and the retention values were constant in this interval. The *p*H ranged from 5.8 to 6.3 in which interval good retention can usually be obtained. A 1 per cent sodium carbonate addition raised the *p*H to 6.6, showing that a considerable quantity of acid had been neutralized. Both adsorbed alumina and retention decreased markedly. At 2 per cent carbonate addition the decrease in both quantities continued, and at 4 to 6 per cent little or no adsorption was evident, and

retention resulted only from the mechanical filtration of the electronegative fibers.

There are two possible explanations for the behavior of sodium carbonate in this regard. The first is the formation of soluble sodium aluminate from alumina. Evidence advanced by Miller *(19)* refutes this possibility, as he has shown that alum flocs observed and analysed to above *p*H 7 still contain considerable alumina, and at *p*H 7 the alumina forms 88 per cent of the floc. It seems more logical to assume, because of the cited literature, that a decrease in the electropositive nature of the alumina resulted from (OH) adsorption. Thus alumina adsorption on to the fiber would therefore decrease and pigment retention followed this trend.

Sodium aluminate has been widely recommended for use in the paper industry, and among the things claimed for it is increased retention of fillers *(10)*. Table VII presents experimental data obtained under the same conditions as Table I. In this case various amounts of sodium aluminate were added to stock which already contained 2 per cent rosin and various amounts of alum.

TABLE VII

Sodium aluminate added, per cent	Experimental ash increment due to Al_2O_3	Retention titanium dioxide, per cent
No Alum		
0	0.0	23.1
1	0.0	21.3
2	0.0	19.6
3	0.0	17.6
4	0.0	17.2
1% Alum		
0	0.12	45.1
1	0.26	43.8
2	0.25	39.3
3	0.23	35.5
4	0.16	36.4
2% Alum		
0	0.32	71.8
1	0.74	71.5
2	0.72	63.8
3	0.68	60.3
4	0.63	55.9
4% Alum		
0	0.40	72.3
1	0.96	73.1
2	1.57	75.5
3	1.65	74.1
4	1.61	75.7

Notes:
1. Experimental technique same as for Table I
2. 7.5 per cent titanium dioxide used in all cases
3. 2 per cent rosin used in all cases.

It will be seen that when sodium aluminate was used without any alum, there was no deposition of alumina on the fiber, and the retention obtained was all in the range which may be attributed to simple filtration. When 1 per cent alum was used without sodium aluminate, the retention obtained was as might be expected from previous evidence already advanced. The addition of sodium aluminate increased the amout of alumina retained in the ash by a constant amount but showed a definite impairment in retention. The same general observations hold true in the cases where 2 and 4 per cent alum were used, but retention may be considered as virtually constant. The above data substantiate the statement of Healy *(10)*, that the addition of sodium aluminate results in a greater precipitation of alumina at lower acidities than are obtainable when alum alone is used but does not affirm his statement regarding improved retention. Even with this more copious precipitation of alumina, no improvement in retention was noted. This raises the question as to whether the nature of the alumina produced is not more important than the actual quantity. It appears evident that alumina produced by the action of sodium aluminate on alum does not have the same electropositive characteristics as that produced by the hydrolysis of alum alone.

This point led to a review of work done some years ago by a different technique in which synthetic alumina was added. The results of such addition are shown in Table VIII.

TABLE VIII.—EFFECT OF SYNTHETIC ALUMINA ON RETENTION

Synthetic alumina added, per cent	pH at sheet machine	Ash of blank, per cent	Al_2O_3 from synthetic alumina, per cent	Retention titanium dioxide, per cent
0.0	5.8	1.21	0.0	57.8
0.5	5.8	1.40	0.19	63.3
1.0	5.8	1.67	0.46	61.6
1.5	5.8	1.94	0.73	63.6
2.0	5.8	2.36	1.15	61.8
4.0	5.8	3.32	2.11	61.3
8.0	5.8	4.77	3.56	56.6

Notes:
1. Experimental technique same as for Table II
2. 2 per cent rosin and 3 per cent alum used in all cases
3. 6 per cent titanium dioxide used in all cases

An examination of Table VIII reveals that the *p*H was constant throughout the test, and that the retention of the synthetic alumina was fairly high. However, there was no appreciable effect on the retention of titanium dioxide in spite of the large amounts of alumina added and retained.

This leads to the assumption that the synthetic alumina was retained mechanically by the fiber mat because of its gelatinous nature, and was not adsorbed on to the fiber. Such mechanical filtration of alumina may improve the retention of pigment somewhat by improving the filtration properties of the mat, but the action is a mechanical one without involved colloidal phenomena.

It is now possible to differentiate between two types of alumina. The first is electropositive alumina resulting from the hydrolysis of alum with a high adsorption capacity for the fiber and acts as a retention aid by virtue of electrostatic effects. The other type of alumina is retained mechanically by the network of fibers and has little or no effect on retention primarily because of the nature of its interface.

Experimental work on the effect of sodium silicate on the retention of fillers indicates that this material likewise has little or no effect. Retentions obtained with sodium silicate fall within the same ranges obtainable with corresponding amounts of rosin size which has been shown to play a very small role in the retention mechanism. Sodium silicate is a negatively charged colloid and so might be expected to behave in much the same manner as rosin, which is also negatively charged.

Effect of Starch

Experimentally it has been shown that starch, which is an electronegative colloid *(28)*, exerts a deleterious effect on retention *(8, 41)*. Starch and cellulose are constitutionally related, and while cellulose is endowed with a rather marked surface adsorption activity, starch is not normally adsorbed to a great extent by paper fibers *(23)*. Alumina on the other hand is one of the comparatively few colloidal materials normally having a positive electric surface charge. Therefore, this condition favors either the neutralization and consequently the precipitation of the starch and alumina, or the adsorption of the alumina by cellulose to give in effect a positive fiber surface to which negative starch may adhere through the agency of what is referred to as an electrostatic cement *(23)*. In other words the effect of alumina on starch is rather similar to its effect on fillers, and the presence of an excess of starch might tend to re-

duce the action of the alumina in "fixing" the filler. There may exist between the starch and the cellulose fiber a competitive selectivity for the alumina which would act as an inhibitor for the cementation of the filler on the fiber.

It has been observed that starch-alumina exists as a delicate gelatinous body, and that this mass will attach to the fibers. Severe mechanical agitation (such as exists in stock preparation) dislodges much of this from the fibers with the formation of gelatinous lumps large enough to be filtered out with ease *(23)*.

The statement that starch might act as an electrostatic cement does not seem valid inasmuch as starch, like most fillers and fiber, is a negatively charged colloid.

Effect of Dilution

The effect of diluting the stock at the sheet machine was to increase the adsorption of alumina and also to improve slightly the retention of titanium dioxide as shown in Table IX.

TABLE IX.—EFFECT OF DILUTION

Conc. of stock in sheet machine, g./l.	pH in sheet machine	Experimental ash increment due to alumina	Adsorption of added alumina, per cent	Retention titanium dioxide, per cent
1.93	4.8	0.25	54	69.6
1.16	5.3	0.34	74	75.6
0.83	5.6	0.40	87	76.1
0.64	5.9	0.49	100	75.7
0.53	6.2	0.53 (?)	100	76.9

Notes:
1. Technique same as that used for Table I
2. See Table IV op. cit. *(41)* for details
3. 2 per cent rosin and 3 per cent alum used in all cases
4. 7.5 per cent titanium dioxide used in all cases

The abovementioned effect was most pronounced at the higher ranges of concentration, and after the stock became very dilute, there was no appreciable change.

A probable explanation is found in the *p*H resulting from the different concentrations. At the high concentration, the *p*H in the sheet machine was low, which would tend to inhibit the hydrolysis of alum. In a sense this confirms what has already been said in a more direct fashion in discussing the results obtained by adding sulphuric acid (as noted in Table III).

Effect of Temperature

An increase in temperature aided retention. Evidently the adsorption of added alumina increased with the rise in temperature.

TABLE X.—EFFECT OF TEMPERATURE

Temperature in sheet machine, deg. F.	Experimental ash increment due to alumina	Adsorption of added alumina, per cent	Retention titanium dioxide, per cent
43	0.33	72	64.7
60	0.36	78	72.9
70	0.37	80	78.6
85	0.40	87	82.6
100	0.41	89	86.7

Notes:
1. Technique same as that used for Table I
2. See Table V, op. cit. *(41)*, for details
3. 7.5 per cent titanium dioxide used in all cases
4. pH 5.5 at sheet machine in all cases

The effect was most noticeable at lower temperatures, although it was also evident over the entire temperature range investigated.

Effect of Basis Weight

It is a well known fact that an increase in basis weight will result in better filler retention, all other factors being constant. In a series of experiments *(41)* in which the basis weights varied from about 30 to 90 pounds, there were no appreciable variations of incremental ash resulting from alumina. The ash was 0.89 for the blank with a *p*H of 6.4 in the sheet machine for the lightest weight sheets but in the remaining cases, where the *p*H varied from 5.2 to 6, the blank ash fluctuated between 0.96 and 0.93 per cent. Actually all these ash figures are practically within the experimental error.

Since the ash determinations show no definite trend, variations in alumina adsorption are excluded.

It may be concluded therefore that the improved retention resulting from higher basis weights is a purely mechanical effect due to the more effective filtration produced by the increased weight and thickness of the fiber mat.

Effect of Hydration

It is likewise a well known fact that an increase in the hydration of stock results in improved filler retention *(41)*. A review of experimental data is given in Table XI.

TABLE XI.—EFFECT OF HYDRATION

Schopper-Riegler freeness	pH at sheet machine	Experimental ash increment due to Al_2O_3	Added Al_2O_3 adsorbed, per cent	Retention titanium dioxide, per cent
810	5.8	0.24	52	52.0
750	5.8	0.31	67	49.0
410	5.7	0.44	100	60.4
270	5.6	0.44	100	69.5
140	5.6	0.64 (?)	100 (?)	75.2

Notes:
1. Technique same as for Table I
2. See Table III, op. cit. *(41)* for details
3. 7.5 per cent titanium dioxide used in all cases

It will be seen that adsorbed alumina tends to increase with beating, although the last figure is so high as to indicate the action of undetermined disturbing factors. With more effective alumina adsorption, there has been a corresponding gain in retention which was far more noticeable at the extremes of hydration.

The effect of hydration resulting from beating may therefore be considered as at least partially colloidal in nature. The increased surface produced by hydration probably results in greater adsorption of alumina, as indicated not only in the larger ash increments due to alumina, but also in a slight lowering of *p*H.

However, the mechanical filtration factor can not be overlooked in this case since the actual interstices are rendered much smaller by the beating action.

Likewise, in drastic beating the fibers may be actually altered with the formation of mucilaginous substances sometimes known as cellulose mucilage. This might act as a mechanical binding agent in the manner outlined by Haslam and Steele *(8)*.

Conclusions

The foregoing analysis leads to the definite conclusion that retention is a combination of mechanical filtration and colloidal factors. If there exists in the system only fiber and filler, any retention obtained is the result of pure mechanical filtration, since there can be no adsorption, because both constituents carry negative colloidal charges. Mechanical filtration may be aided by beating, with reduction in the interstices in the fiber mat, or by an increase in basis weight.

As soon as other materials, such as alum, etc., are introduced into this system, colloidal factors begin to play their predominant part. Alum hydrolyses under equilibrium conditions to form positively charged alumina, which is adsorbed on the negative cellulose and acts as a colloidal cementing agent for filler, starch and rosin.

The alum hydrolysis equilibrium can be upset by either high acidity or alkalinity. If the system is too acid, the formation and adsorption of alumina is inhibited. If the system is alkaline the type of alumina formed is altered. Under either of these conditions, the adsorption of alumina is lessened and retention is decreased. Apparently the optimum condition for the formation and adsorption of alumina is around *p*H 5.5.

There are at least two types of alumina. The first, which is a positively charged alumina resulting from the hydrolysis of alum, has a high adsorption capacity for the fiber, and acts as a retention aid by virtue of electrostatic effects. The second type of alumina is retained mechanically by the network of fibers and has little or no effect on fillers primarily because of the nature of its interface.

The action of alum is primarily not one of flocculation although this may play some part.

Starch, being a negative colloid, does not improve retention.

Data obtained on dilution and temperature effects are quite in accord with the above conclusions. Hydration in addition to improving mechanical filtration also produces an increased fiber surface resulting in greater adsorption of alumina and improved retention.

Retention is a combination of several complex factors. Its colloidal nature is dependent on the alteration of the cellulose fiber interface, so that an attraction for negatively charged fillers will be induced on the fibers.

Although the authors realize that the foregoing analysis is a theoretical treatment of experimental laboratory data, they hope it may serve to furnish indications of value in papermaking.

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Prevention of Oxidation and Rancidity in Paper With Oat Flour*

By Sidney Musher[1]

Abstract

Oxidation spoilage of foods results in loss of fresh flavor and the development of oxidized, tallowy, and rancid flavors which reduce nutritive as well as sales value. Although storage time is an important factor in fresh flavor loss due to oxidation, with many foods this spoilage occurs even with most efficient distribution methods. Milk may become oxidized within several hours after pasteurization, butter may become tallowy within 2 to 3 weeks after churning, and sliced bacon may lose its pleasant freshly smoked flavor before it even reaches the home.

Among the products which have been proposed as

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oxidation inhibitors or "antioxygens" are the hydroxybenzenes such as hydroquinone (1), aromatic amines (2), phenyl phosphites (3), and furfural (4). These materials have never come into wide use in the food industry due presumably to their toxic character.

The utilization of the cereal flours, and particularly of oat flour, as antioxygens (5) started in 1936 when the Quaker Oats Company, under agreement with Musher Foundation Inc., who own and control the basic patents (6), offered a pure specially milled oat flour under the trade name Avenex to protect fatty foods against oxidation and rancidity.

In 1939 about 150,000,000 pounds of food products were directly processed with oat flour, and the protective value of the cereal antioxygens has been shown in some 30 articles published as a result of about 20 fellowships established by Musher Foundation Inc., at State and Federal laboratories.

The application of oat flour to paper and paperboard used for the packaging of oxidizable food compositions is a recent development *(7)*. The treatment of the food wrapper with oat flour has the distinct advantage of not requiring special labeling which is particularly important in view of the present strict labeling requirements.

How the Oat Flour is Prepared

When the oats are delivered to the mill, the groat is firmly encased in the hull. The oats are cleaned to separate other grains, weed seeds, and foreign materials. The cleaned oats are then heated to slightly under 212 deg. F. for over an hour which is more than sufficient to kill any mold and probably all pathogenic organisms, and the moisture content is reduced from 10 or 12 per cent to about 6 per cent. The oats are then hulled, and the oat groats are pearled to remove the outer bran covering. The pearled groats are then ground, and the remaining bran is removed by sieving. Each operation is conducive to lowering the bacterial count.

Identification of Oat Flour Antioxygens

Although careful attention has been given to identifying the active antioxygenic agents present in oat flour, it has not been possible to determine the structure of these antioxygens. Antioxygenic extracts of oat flour have been prepared using water, ethyl alcohol, butyl alcohol, ether, acetone, and low and high boiling hydrocarbons as solvents. It appears as if several antioxygens of complex character are present in oat flour which upon ultimate extraction are so changed as to reduce the antioxygenic effect and which in combination show marked inhibitory activity.

When oat flour is heated to gelatinization by boiling or when heated to 400 to 500 deg. F., there is no material reduction in the antioxygenic effect. Complete hydrolysis of the oat flour by the use of acids or enzymes is undesirable.

How the Oat Flour is Applied to Paper

The oat flour is applied as a surface sizing in an amount ranging from 0.5 to 2 per cent by weight on paper and from 0.5 to 0.75 per cent by weight on paperboard. Its addition to the beaters is undesirable since that portion of the antioxygens which are water soluble is lost, if a beater sizing is employed.

A solution is prepared containing about 5 to 10 per cent oat flour, and this solution is used in the tub or at the calenders together with other sizing ingredients, holding the oat flour in suspension with agitation or continuous circulation. The oat flour may also be applied as a spray on the Fourdrinier wires at the wet end of the paper machine.

Since oat flour contains over 60 per cent total starch with gelatinization at about 160 deg. F., the lowest possible temperature should be maintained during application. The presence of 0.5 per cent cooked oat flour or cooked starch in the tub will assist in holding the uncooked oat flour in suspension.

Waxed and Oil Impregnated Papers

The oat flour treated paper or paperboard may be paraffined or oil impregnated, and even though the oat flour film is completely covered by the paraffin or oil, the antioxygenic effect is retained. Where the oat flour is mixed with the paraffin and the paper waxed with the combination of oat flour and paraffin, a serious reduction in the moistureproofness normally afforded by the paraffin results. By applying the oat flour as a surface sizing on the paper or paperboard and then paraffining, the moistureproofness of the paraffin is unchanged.

Treated Papers and Paperboards as Food Wrappers

Oxidation and rancidity begin most frequently at the exposed surfaces of a food and gradually penetrate into the center portions, where there is contact with the wrapper. The wrapper is, therefore, treated on that side which comes into direct contact with the food, whether the contact be complete or continuous as in the wrapping of butter or incomplete or discontinuous as in the packaging of crackers.

Continuous Surface Contact

In the case of many foods such as butter, lard, shortening, and margarine, the surface is in direct contact with the paper liner. Where the paper is surface sized with oat flour, and there is complete contact with the surface of the butter, e.g., the improvement in the keeping quality of the butter surface later reflects an improvement in the quality of the inside of the butter print.

Discontinuous Surface Contact

In the packaging of biscuits and crackers, whole wheat cereals, pork loins, potato chips, candies, and other similar foods, there is only a partial or incomplete contact between the food and the wrapping paper, but an improvement in keeping quality is observed even though the contact is not complete.

When crackers are packed in a carton having an inner paper liner, some of the fat of the crackers is adsorbed in a film on the surface of the paper and rancidity quickly develops. It frequently happens, therefore, that when a package of crackers is opened, a rancid odor is observed from the adsorbed fat film, although the crackers are perfectly good. The rancid fat on the paper then appears to catalyze rancidity in the nonrancid crackers.

The oat flour treated paper reduces rancidity of the adsorbed fat film and also improves the keeping quality of the packaged food that has discontinuous surface contact with the paper.

Oat Flour Treated Papers in the Dairy Industry

Butter Wrappers

Table I shows the results of studies *(8, 9)* on using oat flour sized and regular parchment paper for the wrapping of butter. Since the complete range of

TABLE I—COMPARISON OF AVENEX TREATED* AND UNTREATED PARCHMENT ON SCORE OF BUTTER STORED AT 45 DEG. F.

Sample	Score** of Butter and Age of Samples			
Pennsylvania State College report	Initial	3 weeks	6 weeks	9 weeks
Regular parchment	92.	89.	89.	88.5
Avenex parchment	92.	90.5	90.	90.
University of Illinois report (surface scores)	Initial	2 weeks	4 weeks	6 weeks
Regular parchment	88.	87.	86.5	87.
Avenex parchment	88.	87.5	87.75	88.

* Parchment sized with approximately 1 per cent oat flour.
** Complete range of butter scores = 86 to 94.

butter scores is no more than about 8 points, an improvement of ½ to 1½ points by the oat flour treated parchment as shown in the reports is of definite value to the butter industry.

Milk Containers

With respect to fresh market milk, it is not generally known that oxidation is a problem, and yet the development of an oxidized flavor in milk is one of the most serious problems facing the milk industry. With better refrigeration facilities and more cleanliness at the milk plant, the bacterial count of milk has been steadily reduced, and since the bacteria, heretofore, have acted as natural inhibitors to oxidation, it is the finer grades of milk and milk produced in the cleanest plants that are most susceptible to oxidized flavors.

Table II shows the results *(10, 11)* of using glass bottles, untreated paper milk bottles, and treated paper bottles made by applying 0.28 per cent oat flour as a surface sizing on board and then fabricating the bottles and paraffining as usual. It may be observed that even within the 24 to 72 hour test period a definite inhibitory effect is obtained with the treated paper bottle, whereby tallowy and oxidized flavors are materially retarded. This effect is particularly surprising, since the milk fat globules are encased in an aqueous medium and are completely out of contact with the oat flour under the paraffin film.

TABLE II—COMPARISON OF AVENEX PAPER BOTTLES* WITH UNTREATED PAPER AND GLASS BOTTLES IN PREVENTING THE OXIDIZED FLAVOR IN MILK

Sample	Description	Degree of Oxidized Flavor 24 hr.	48 hr.	72 hr.
	Pennsylvania State College report**			
1	Control glass bottle	+	++	++
2	Control paper bottle	±	+	+
3	Treated paper bottle	−	−	−
	New Jersey Experiment Station report***			
4	Control glass bottle	+	++	+++
5	Control paper bottle	+	+	+
6	Treated paper bottle	−	−	−

* Board sized with 0.28 per cent oat flour before paraffining.
** Milk held in the dark without exposure to light at approximately 40 deg. F. before scoring.
*** Milk exposed to sunlight for 30 min. after packaging and before refrigerating.

TABLE III—STABILITY OF FAT OF SLICED BACON WRAPPED IN AVENEX* AND REGULAR PARCHMENT (UNIVERSITY OF ILLINOIS REPORT)

Bacon	Out of cure days	Wrapped days	Regular parchment, hr.	Avenex parchment, hr.
726	19	13	5**	12**
729	19	13	6	9
728	21	15	8	12
736	21	15	11	12
799	21	15	9	14
726	42	15	6	7
729	42	15	7	7
728	43	16	8	7
736	41	14	7	10
799	41	14	9	11

* Parchment sized with approximately 1 per cent oat flour.
** Hours before 20 cc. extracted bacon fat developed rancidity with air bubbling through sample at 208 deg. F.

Similarly, oat flour treated paper liners and cartons may be used in the packaging of market cream, ice cream, cream cheese, and whipping cream.

Oat Flour Treated Papers in the Meat Packing Industry

Table III shows the results of studies *(12)* using oat flour treated and regular parchment for the wrapping of sliced bacon. In each case the sliced bacon was wrapped with the treated and regular parchment, stored at 32 deg. F., the fat extracted, and tested for stability as indicated.

The oat flour treatment may also advantageously be applied to parchment, greaseproof, and glassine papers for the packaging of lard, margarine, and hams as well as to oil impregnated and waxed sulphite papers used for the packaging of pork loins, beef, mutton, and other fatty meats, where yellowing of surface fat, rancidity, and loss of fresh flavor are problems.

Oat Flour Treated Papers in Other Food Industries

The application of oat flour as a surface sizing on paper and paperboard has been found of value for the packaging of toasted whole wheat cereals, coffee, candies and confections, essential oil flavored gelatin desserts, bakery products including cartons for doughnuts and pastries, and similar foods.

In some cases the oat flour treatment has been found of particular value in retarding the development of a "cardboard" odor which sometimes contaminates the food. For example, the treatment of secondary stock board with oat flour reduces contamination of packaged whole wheat breakfast cereals, and the odor of the paperboard itself is noticeably lessened *(13)*.

Moreover, in an unpublished study *(14)* reported here with permission, the following conclusions were reached on the effect of using oat flour surface sized and untreated paperboards as egg case flats and liners for storing eggs at 32 deg. F. over a 9 month period:

"(a) There is no indication that the flavor of raw eggs stored in Avenex cartons is superior to the flavor of raw eggs stored in untreated cartons.
(b) There is a slight indication that the flavor of cooked eggs stored in Avenex cartons is more desirable than the flavor of cooked eggs stored in untreated cartons.
(c) There is a rather marked preference for the odor of eggs stored in Avenex cartons over the odor of eggs stored in untreated cartons."

Effect of pH of Paper on Oat Flour Antioxidants

Bleached sulphite, bleached groundwood, and bleached kraft pulps at *p*H 6 and *p*H 8 were ground and duplicate 2-g. portions were weighed out and transferred to 125-cc. Erlenmeyer flasks. To one set of samples 1 g. of oat flour was added, and on all samples 75 cc. of molten lard were poured, and the mixture well shaken. The flasks were all provided with a one-hole rubber stopper through which was inserted a short bent glass tube allowing air to enter. The samples were stored at 110 deg. F., the lard remaining liquid and thus facilitating removal of 2-cc. portions of the lard for peroxide determinations using the method of Wheeler *(15)* as an indicator of rancidity. The rancid point of lard is considered to be reached at a peroxide number of 20. The results given in Table IV indicate that oat flour is particularly effective at *p*H 6. Apparently bleached sulphite develops peroxides more rapidly than either bleached groundwood or bleached kraft.

Effect of Oat Flour on Bacteria Count

Since the oat flour is applied as a surface sizing, and since the surface of the paper or paperboard is subjected to the highest temperature during drying, it is expected, that the oat flour will not increase bacteria count. In one series of tests, comparative counts per gram were taken of treated and untreated parchment and secondary stock boards, the results of which are shown in Table V.

Conclusions

The use of oat flour as a surface application on paper and paperboard has promise for retarding oxidative deterioration of food products and particularly of fatty foods. This process is of particular importance to the paper industry, since it is difficult to apply such a treatment to glass, rubber, tin, and other packaging materials competitive with paper. At the same time, the application of oat flour to paper opens new outlets for the use of an American agricultural product and thereby assists the farmer in disposing of one of his surplus crops.

TABLE IV—COMPARISON OF OAT FLOUR TREATED AND UNTREATED PULPS AT pH 6 AND pH 8 ON THE OXIDATION OF LARD AT 110 DEG. F.

Sample	Identity	Treatment	pH	Peroxide number; storage, days				
				0	2	4	6	10
1	Bleached sulphite	none	6	0.7	4.0	25.0	75.0	92.0
1a	Bleached sulphite	oat flour	6	0.7	6.0	7.0	7.0	28.0
2	Bleached sulphite	none	8	0.7	4.0	5.0	7.5	16.5
2a	Bleached sulphite	oat flour	8	0.7	4.7	12.5	31.5	66.5
3	Bleached kraft	none	6	0.7	4.3	4.0	6.0	17.5
3a	Bleached kraft	oat flour	6	0.7	3.0	3.0	3.5	6.0
4	Bleached kraft	none	8	0.7	3.0	3.5	4.5	7.0
4a	Bleached kraft	oat flour	8	0.7	4.5	2.5	3.5	4.5
5	Groundwood	none	6	0.7	8.0	8.0	10.5	13.5
5a	Groundwood	oat flour	6	0.7	5.5	5.5	5.5	6.5
6	Groundwood	none	8	0.7	6.5	6.5	8.5	10.7
6a	Groundwood	oat flour	8	0.7	5.5	5.5	7.5	8.7

TABLE V—BACTERIA COUNTS OF TREATED AND UNTREATED PAPERS

Identity	Counts per gram	
	Test 1	Test 2
Avenex parchment*	20	30
Regular parchment	20	40
Avenex board**	1306	1272
Regular board	1326	1352

* Sized with about 1 per cent oat flour.

** Secondary stock paperboard sized with about 0.5 per cent oat flour.

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How the Properties of Adhesives Are Related to the Properties Of Paper Surfaces*

By F. Camps-Campins[1]

Abstract

The comparative pore structures for a few papers are evaluated from their air content values. The penetrating properties of the adhesive have to counterbalance the pore size of the paper; papers with small pores require penetrating types of adhesive, while papers with large pores need filming types. Further, pore size affects the rate at which adhesives set, and, also, the behavior of wet glue films under pressure. The properties of the adhesive must compensate for these factors and for unequal porosities in the surfaces to be adhered.

A Comparative Picture of the Pore Structure of Papers

The thickness of a sheet of paper in conjunction with its basis weight is a measure of the mass or weight of a definite volume of that paper. Thus, for glassine of 0.001 in. thickness, the basis weight for 500 sheets 24 in. by 36 in. is 20 lb., or 1 cu. ft. of glassine weighs 80 lb. The specific gravity of paper is approximately 1.5, it follows that 1 cu. ft. of air-free paper has a mass of 94 lb. On this basis, the actual volume of air-free paper in 1 cu. ft. of glassine is 80/94 = 0.85 cu. ft. *(1)*. This is shown in Fig. 1. Now in order to obtain a comparative picture of the pore structure of the various papers, these air content values must be expressed in terms of a common basis, e.g., cu. ft. of air per cu. ft. of air-free paper. Thus the number of cu. ft. of air per cu. ft. of air-free glassine is 0.15/0.87 = 0.17.

Applying this method of calculation to a few types of paper we obtain the values in Fig. 2, which shows the comparative volumes of the different papers that contain the same amounts of air-free paper. Figure 2 may, also, be considered to give a semiquantitative picture of the relative pore sizes.

How Controlled Penetration of the Adhesives is Achieved for the Various Pore Sizes

As successful adhesion of porous surfaces depends upon controlled penetration, so as to insure film continuity between the surfaces, the penetrating proper-

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ties of the adhesive selected must compensate for the size of the pores. Thus, papers having small pores, e.g., glassines and bonds, which are difficult to penetrate, necessitate adhesives which have a great tendency to penetrate. In achieving this, recourse may be had to any or all of the factors that promote penetration; these include, long wet-life, low angle of contact, low viscosity, and high surface tension in addition to those physical factors which contribute to obtaining these effects. In general, these glues are noncohesive and slow-drying.

Note: The rate at which size penetrates uniform capillaries is given by

$$\frac{dh}{dt} = \frac{r\,\gamma \cos\theta}{4\,n\,h} - \frac{r^2\,d\,g}{8\,n}$$

And this relation may be used to give some idea of the controlling factors in the penetration of adhesives.

Thus,
- n = pore radius
- γ = surface tension of the liquid
- θ = angle of contact between the liquid and the surface *(2)* θ must be less than 90 deg., otherwise capillary penetration is impossible for $\cos 90 = 0$.
- $\gamma \cos\theta$ = penetration tension *(3)*
- d = density of the liquid
- h = height to which liquid has penetrated
- n = viscosity; as the adhesive loses water to the stock, n increases and slows up the penetration

$$\text{Amount of Penetration} = \int_0^t \frac{(dh)}{(dt)}\,dt;$$ where t = wet life of the adhesive

Factors which extend wet-life ordinarily extend amount of penetration.

Papers with large pores are easy to penetrate and may even expose the adhesive to the risk of excessive penetration, or what may also be called falling through of the adhesive.

One way to accomplish controlled penetration for this case is by using any viscous fairly noncohesive type of glue and having it dry before complete penetration. This may be impractical if, in a damp atmosphere, the wet life of the adhesive is revived and so penetration will continue till the film continuity of the glue between the surfaces is destroyed, resulting in failure. We might add that the use of a thick film of glue of this type would no more solve this problem than would the use of a thick layer of water serve to hold water in a leaky can.

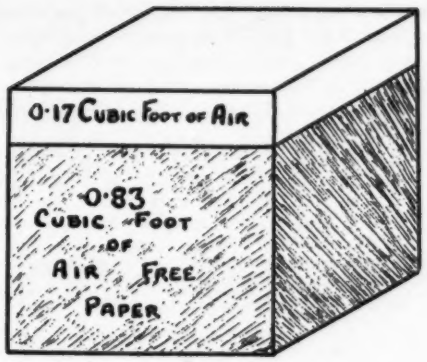

Fig. 1.
One cu. ft. of Glassine = (0.17 + 0.83)

Another method is to use cohesive types of adhesives that have strong filming properties, making provision, if necessary, for increases in the pore size by increasing the filming properties. The principal characteristic of these glues is that they set well before the drying operation is complete and so partly paralyze the penetration process, permitting the glue to maintain film continuity during the drying process and obviating the risk of revival of further wet-life penetration in a damp atmosphere.

Thus for seam work on kraft bags or for kraft envelopes, where the adhesive bond is under no tension due to stacking, failure through excessive penetration is a common cause of complaint, and the remedy is to increase the filming properties of the adhesive. These facts are summarized in Fig. 2.

Let us consider a 1 sq. in. area of adhesive of a definite film thickness, applied to a paper surface. If the paper has small pores, it will expose a greater quantity of actual paper surface to the adhesive, than if it has large pores. Now the adhesive sets mainly by losing water into the actual paper surface.

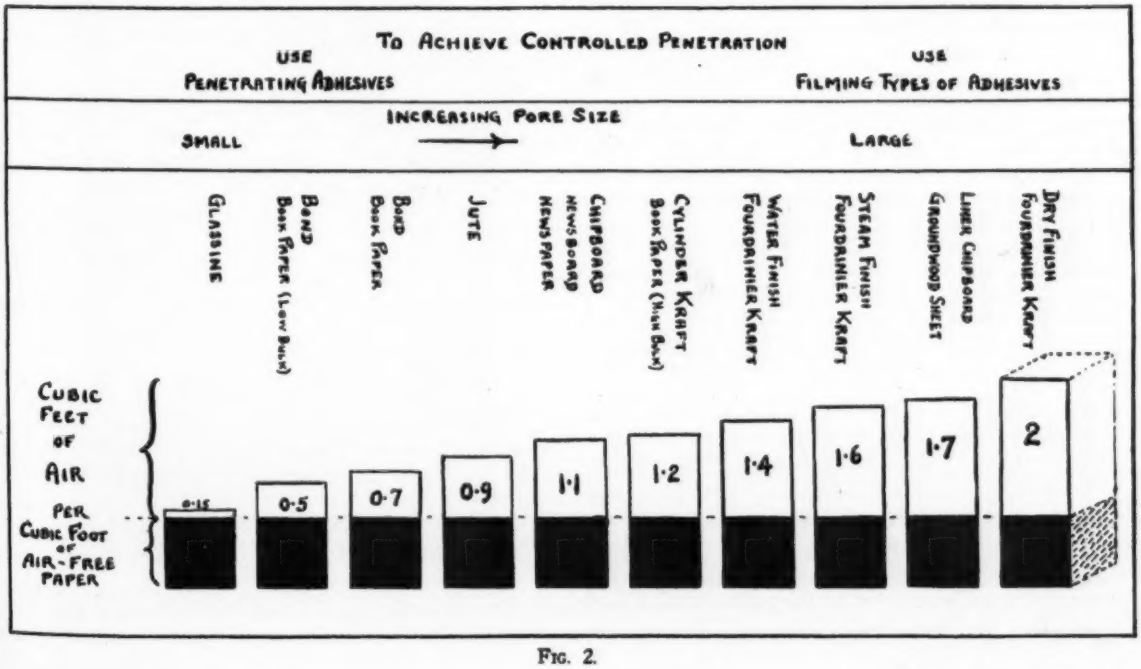

Fig. 2.

Therefore the quantity of water removed in a given time from the adhesive will be greater for a paper with small pores, than for one with large pores. Or, in other words, other things being equal a glue will set at a faster rate on a paper surface with small pores than on one with large pores (Fig. 3).

As an example, in the sealing of corrugated fiber containers, let us contrast the glue requirements where the liners are jute, and where they are dry finish Fourdrinier kraft. Here, the case sealing equipment provides a fixed compression time during which the freshly glue treated surfaces are held in good contact and free from tension so as to allow the adhesive time to set.

Now a given adhesive will set faster on the jute liner with its relatively smaller pores than on the wide-pored kraft. But as the equipment allows both liners the same time, the glue used for the dry-finish wide-pored Fourdrinier kraft liners must be faster setting than that for the jute liners in order to compensate for the decrease in the actual paper surface as the pore size increases.

An interesting problem occurs when, instead of having 2 porous surfaces to be adhered, one face is coated over with a relatively nonporous coating. Let us compare the physical responsibilities of the adhesive in these 2 cases.

Assume that the adhesive loses x parts of water into each porous face during, say, the first second. Then for 2 porous faces, it loses in the first second $2x$ parts of water, which we will consider as the requisite quantity of water that must be removed from the glue before it can set and so secure the adhesive bond. Where one of the faces is relatively nonporous, the adhesive will now lose only x parts of water in the first second to the porous face. Further, after the porous face has absorbed this x parts of water, it is not too eager to absorb the other x part of water requisite for the setting of the glue. Thus during the second second, it will probably absorb $x/2$ parts of water, indicating a time requirement of well over 2 and more likely 3 times that necessary for sealing 2 porous surfaces.

This explains why the rate of production of double faced corrugated board is often cut to 1/3 of its normal value, when a relatively nonporous asphalt treated corrugation replaces the regular straw or chesnut board corrugation.

As another responsibility of the adhesive where the surfaces to be adhered are of unequal porosity, is to try to equalize the penetration into the 2 faces; it becomes apparent that the slowing down of the setting rate into the porous face to 1/3 of its former value as discussed above, has an effect in the direction of equalizing the penetration, as it extends the wet life against the nonporous face. However, in many cases it is necessary to make special provision that the penetration of the adhesive into the more porous face be slowed up still more. This usually involves the use either of very viscous, slow-drying adhesives or of cohesive products that set while still wet.

The Effect of Pressure

A prerequisite to adhesion is that the freshly glued off surfaces be brought into intimate contact. This contact is usually achieved by the application of pressure. Now pressure, depending upon its magnitude, the size of the pores, and the properties of the adhesive will have a good or bad effect upon adhesion by promoting or destroying controlled penetration, and/or film continuity. Pressure will force the adhesive into large pores more rapidly than into small pores. Thus, there will be more difficulty experienced through the application of pressure in the lining of chipboard with large-pored kraft paper, rather than with small-pored sulphite paper on say a Waldron or a Parry machine.

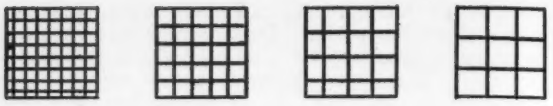

FIG. 3.
Actual Paper Surface Decreases as the Size of the Pores Increase. Adhesive Sets Mainly by Losing Water to the Actual Paper Surface. Adhesive Sets More Slowly as Actual Paper Surface Decreases.

For a given pore size, increasing pressure will tend to destroy film continuity by forcing the adhesive into the pores. To counteract this, the viscosity, the cohesiveness, and the rate of setting of the adhesive may be increased. Practical objectives are fulfilled when the properties of the adhesive permit of a good bond at the desired rate of production and within the range of commercial pressures used.

A special case arises for rough surfaces where increasing pressure will really enhance contact of the surfaces and at the same time not tend to destroy film continuity due to the irregularities in the surfaces. Under these conditions, high pressure is beneficial to adhesion.

The penetrating properties of the adhesive must counterbalance the pore size in order to achieve controlled penetration and so maintain film continuity of the glue. Papers with small pores require highly penetrating glues, while papers with large pores need glues that film rather than penetrate.

Where the rate of setting of the adhesive is important, this rate must also compensate for the pore size. Other things being equal, a glue will set more rapidly on a small than on a large pored paper.

Where the surfaces to be adhered are of unequal porosity, the rate of setting of the adhesive is greatly reduced. This effect helps to extend the wet-life of the adhesive against and so its penetration into the surface of low porosity. In difficult cases, the adhesive has to have special properties to help it to equalize its penetration into the 2 surfaces.

High pressure on the freshly glued off surfaces, may cause failure of the adhesive bond through excessive penetration of the glue into open and porous stocks, and/or through destroying the film continuity on close and nonporous stocks. On rough surfaces high pressure will bring about contact and so be beneficial.

All these relationships between pore size and adhesive requirements can profitably be examined as a basis for the selection and application of sizes to paper. Obviously, also, there is a relation between the sizing of the paper and the properties. of the adhesives.

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Bending Tests of Corrugated Board and Their Significance*

By T. A. Carlson[1]

Abstract

The stiffness of corrugated fiberboard depends not only on the stiffness of the liners but also on the shear rigidity of the corrugated sheet. In bending tests with the flutes perpendicular to the span the amount of shear deformation has an important influence on stiffness. In spans of 5 in. or less the amount of deflection due to shear in A-flute boards with 0.016-in. liners may be as great or greater than the deflection due to tension and compression. With flutes parallel to the span the shear deformation is considerably less and in spans greater than 10 in. may for practical purposes be neglected.

The amount of overhang used in bending tests also affects the stiffness. It is believed that an overhang of ½ in. would generally be within practical limits for moderate to long spans. Bearing plates at supports and under the loading block are suggested to minimize local bending and crushing.

During the past few years considerable progress has been made in the development of a number of new or improved methods of testing fiberboard. One of the tests that has recently received increased attention is the static bending or beam test. As this test makes possible the use of well-known engineering principles to determine strength properties of corrugated boards its use should be encouraged.

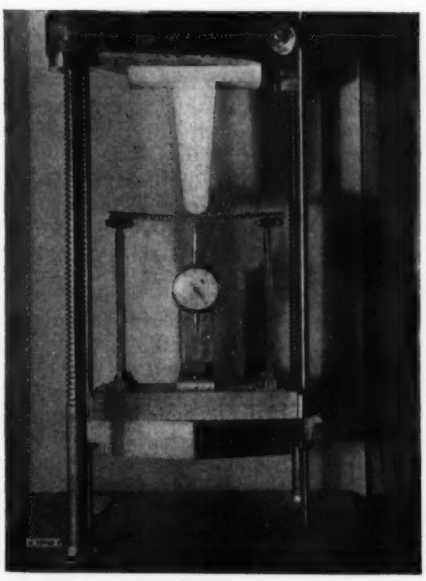

FIG. 1.
Method of Conducting Static Bending Test of Corrugated Board in a Universal Testing Machine. Flutes Perpendicular to Span. Shear Deformation is Shown by Slant of Corrugations and Curvature of Beam.

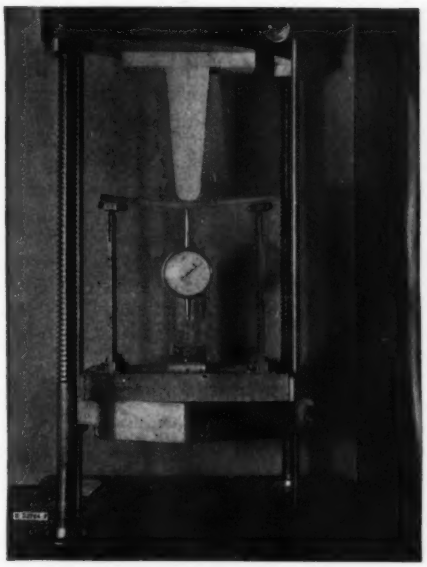

FIG. 2.
Method of Conducting Bending Test of Corrugated Board in a Universal Testing Machine. Flutes Parallel to Span.

The static bending test is very simple to make. The common procedure consists essentially of placing the specimen horizontally on two supports, one under each end, and then applying a vertical load on the upper surface. The load is commonly concentrated at the center, or 2 symmetrical loads may be used, the latter frequently being placed at the third points of the span. Because of the greater simplicity of the center loading method, it was used in the tests discussed in this paper. As the load is increased, simultaneous readings of load and deflection are taken. The relation between the loads and deflection is a measure of the stiffness of the material tested.

Elaborate equipment is not needed for making static bending tests of corrugated board. A simple apparatus *(1)* used at the Forest Products Laboratory for testing fiber insulating and building boards has recently been adapted for tests of small sized specimens of corrugated board with apparently satisfactory results. In this test method *(2)* the load is applied by water running at a definite rate into a pail suspended from a stirrup at the midpoint of the beam. The amount of deflection at the point of applying the load is measured by means of a lever arm attached to the stirrup in such a manner that the long arm of the lever magnifies the movement of the stirrup and indicates the deflection on a calibrated scale. Other simple methods of making static bend-

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[1] Member TAPPI, Senior Engineer, Forest Products Laboratory, Forest Service, U. S. Dept. of Agri. maintained at Madison, Wis. in cooperation with the University of Wisconsin.

ing tests have been employed by different laboratories through adaptation of equipment already available.

The static bending tests made by any of the various methods should provide useful information about corrugated board, but there are certain influences that should be taken into consideration in order to get the most value from the test, particularly if it is desired to compare results from different laboratories.

The purpose of this article is to discuss 2 of the important factors that influence the results of bending tests, namely span-depth ratio and overhang. Other factors, such as rate of loading, refinement of readings, shape and size of loading blocks, and method of support that are known to have a bearing on the results are not discussed here. A general description of the static bending tests made at the Forest Products Laboratory to evaluate the strength and stiffness of corrugated board, and their relation to other tests have been discussed elsewhere *(3)* and will not be repeated here. Although the stiffness of corrugated board is also known to be influenced by the type and thickness of liners, the quality and thickness of corrugating medium, and the form of the corrugations, this discussion deals primarily with tests of A-flute board made with 0.016-in. liners and 0.009-in. corrugations. Figures 1 and 2 show the method of conducting the tests.

Influence of Span on Stiffness

One of the important conditions considered is the span, or distance between supports. Aside from the need for adapting the size of specimen to the capacity of the testing equipment, it was found desirable in this study to use a number of different spans in testing each kind of board in order to obtain full information regarding the stiffness of the material.

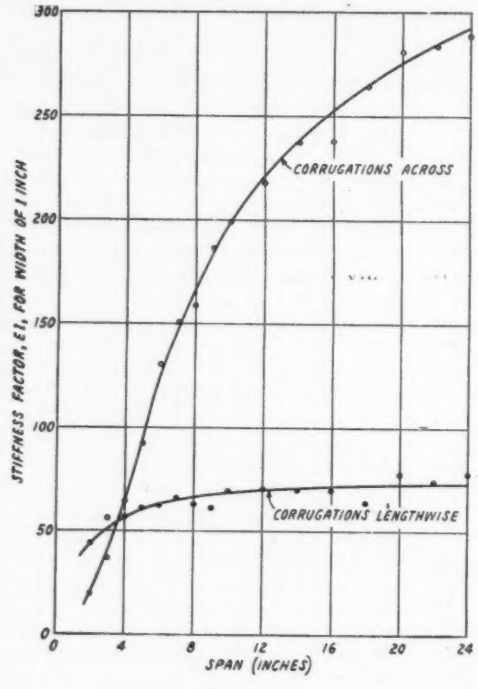

FIG. 3.

Relation of Stiffness Factor *EI* of Corrugated Board to Length of Span. Both Curves are for A-Flute Board Made with 0.016-in. Liners and 0.009-in. Straw Paper.

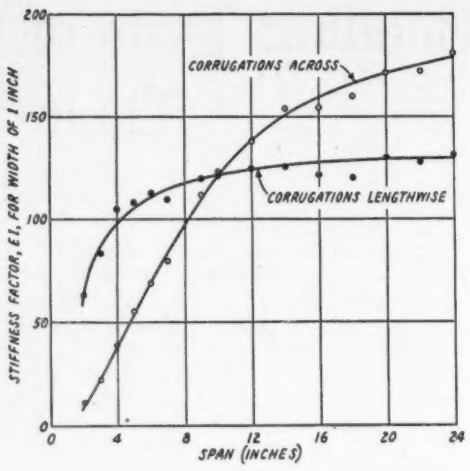

FIG. 4.

Relation of Stiffness Factor *EI* of Corrugated Board to Length of Span. Both Curves are for A-Flute Board Made with 0.016-in. Fourdrinier Kraft and 0.009-in. Straw Paper.

The stiffness of a beam, which is the measure of its resistance to deflection, is indicated by the form of the section, the modulus of elasticity E of the material, and the shear rigidity. The deflection of a beam under load varies inversely as the modulus of elasticity, i. e., the higher the modulus the less the deflection. In the conventional beam formula for center loading the modulus of elasticity E is given by the expression:

$$E = \frac{PL^3}{48I\Delta}$$

in which P is the applied load, L is the span (distance between supports), I is the moment of inertia of the cross section, and Δ is the deflection of the beam at the center. For comparing beams of a given cross section, use is often made of a stiffness factor EI to show relative stiffness or rigidity. This factor has been found to provide a convenient means of studying the stiffness of corrugated board. As E is a property of the material and as I is a function of the dimensions, the stiffness factor EI would be expected to have a constant value regardless of the span for specimens of any given direction of flutes with respect to the direction of the span. Actually, however, some of the deflection that occurs is due to shear distortion. As the conventional formula does not take shear distortions into account it will not show the true conditions. In fact, the values of EI as calculated from test data using this formula were found to vary with the span.

The extent to which shear deformation causes the stiffness factor EI as computed with this formula to vary with the span is shown by the curves of Figs. 3 and 4. Figure 3 presents the results of tests of a corrugated board made from cylinder liners and Fig. 4 from Fourdrinier liners. It is apparent from these curves that the shear distortion is of considerable importance, particularly in short beams having corrugations perpendicular to the length. If there were no shear distortion the curves of Figs. 3 and 4 would be straight horizontal lines. In order to obtain a true picture of the relative portion of the deflection contributed by shear and by true bending it is necessary to resort to a more exact formula. For this

purpose the Forest Products Laboratory used the following formula *(4)*:

$$\Delta = \frac{PL^3}{48EI} + \frac{KPL}{F}.$$

The notation is the same as in the first formula with the addition of F, which is the shear modulus, and K, which is a constant depending on the shape of the beam and the manner of loading. In this formula the first term on the right hand side represents the deflection due to tension and compression, and the second term represents the deflection due to shear.

By substituting in this formula proportional limit values of Δ and P from the tests it is possible to estimate the amount of deflection due to shear and the amount due to tension and compression. The results of such determinations using the data from the curves of Figs. 3 and 4 are shown in Figs. 5 and 6. These results show that when the corrugations are parallel to the length of the beam the amount of deflection due to shear is small and for spans greater than 10 or 12 in. could in general be neglected. However, when the corrugations are perpendicular to the length, the amount of shear deformation assumes greater proportions. In spans of 5 in. or under it is equal to or greater than the deflection due to tension and compression of the facings.

As the amount of shear distortion becomes less with an increase in span, it would appear possible to determine the stiffness of the liners in a piece of corrugated board by making a test over a span of such length that shear would not be an appreciable factor. For board with corrugations parallel to the length such a test over a span of 12 in. or more should give a good approximation. However, for board with corrugations perpendicular to the length the size of the specimen necessary for such a test would generally be beyond such convenient limits. An idea of the sizes of specimens used to obtain satisfactory readings of loads and deflections with the equipment employed in these tests is indicated by the typical data given in Table I.

While the foregoing discussion indicates that the size of test specimen must be considered in making comparisons of bending tests of corrugated board, there is another factor involved, the amount of overhang.

Influence of Overhang

The length of span as previously mentioned is the distance between supports. The length of span thus

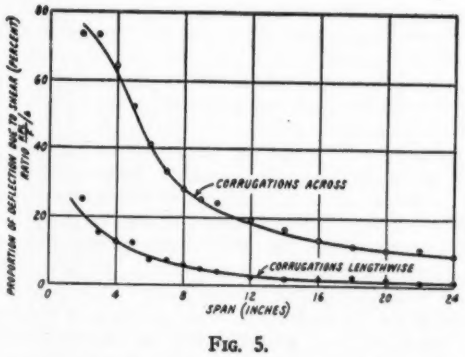

FIG. 5.

Amount of Deflection Due to Shear Distortion for Different Spans in Static Bending Tests of A-Flute Corrugated Board Made from 0.016-in. Jute Liners and 0.009-in. Straw Paper.

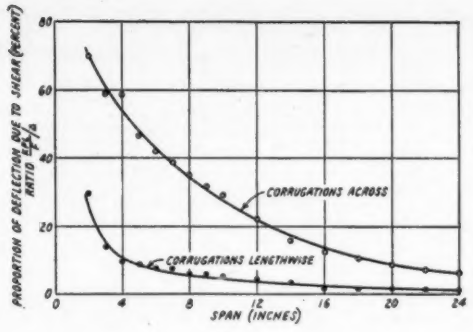

FIG. 6.

Amount of Deflection Due to Shear Distortion for Different Spans in Bending Tests of A-Flute Corrugated Board Made from 0.016-in. Fourdrinier Kraft Liners and 0.009-in. Straw Paper.

does not include the overhang, which is the part of the beam that must necessarily extend beyond the supports in making the tests. The actual overall lengths of specimens tested were in each instance 1 in. greater than the span. This provided an overhang of ½ in. at each end of the beam. The effect of varying the overhang was studied by means of bending tests over 2 and 4-in. spans in which different ratios of total length to span length were used.

The material for these tests consisted of a double-faced corrugated board made from 0.016 in. cylinder kraft liners and 0.009-in. straw paper. The effect of different amounts of overhang on the stiffness factor of this board as calculated by substituting test values

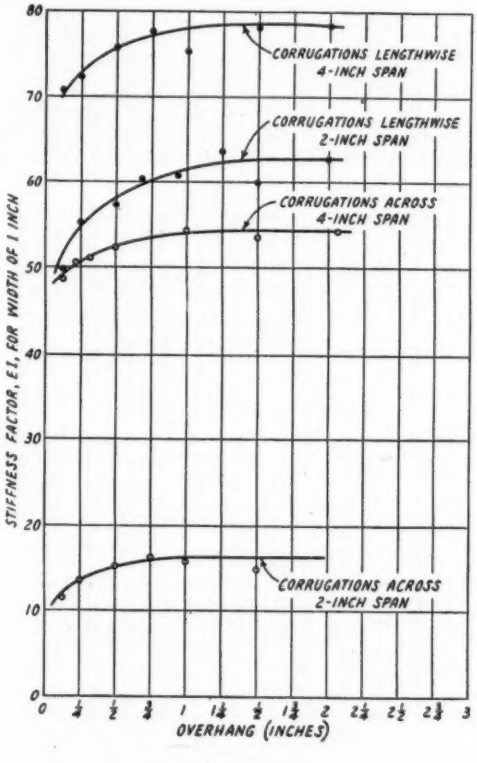

FIG. 7.

Influence on Stiffness Factor EI of Amount of Overhang in Bending Tests of A-Flute Corrugated Boards Made with 0.016-in. Cylinder Kraft Liners and 0.009-in. Straw Paper.

TABLE I.—DATA[1] FROM BENDING TESTS OF A-FLUTE CORRUGATED BOARD

(Board made from 0.016-in. Fourdrinier kraft and 0.009-in. straw)

Size of specimen		Average load at		Average deflection at	
Span In.	Width In.	Apparent proportional limit Lb.	Failure Lb.	Apparent proportional limit In.	Failure In.
Corrugations Lengthwise					
2	2	9.8	11.6	0.013	0.039
3	2	8.3	10.6	.028	.041
4	2	4.1	9.0	.026	.078
5	2	3.9	8.0	.047	.126
6	2	3.3	7.4	.066	.189
7	2	2.7	5.9	088	.239
9	3	2.6	7.0	.110	.378
10	6	4.2	12.9	.121	.482
12	6	3.7	10.5	.179	.644
14	8	4.5	12 5	.259	.941
16	12	6.0	15.0	.352	1.096
18	12	6.4	13.6	.540	1.426
20	16	5.2	16.9	.418	1.700
22	16	4.6	11.7	499	1.537
24	16	5.4	12.7	.742	2.093
Corrugations Across					
2	2	3.5	6.6	.026	.102
3	2	2.8	5.4	.036	.112
4	2	2.7	5.2	.046	.124
5	2	2.3	4.3	.054	.126
6	2	2.2	4.9	.072	.206
7	2	1.5	4.1	.067	.212
9	3	2.1	4.6	.095	232
10	4	2.1	5.6	.089	.271
12	4	2.4	5.0	.157	.366
14	4	1.8	4.4	.167	.441
16	4	2.1	3.7	.290	.537
18	4	2.2	3.3	.416	.616
20	8	2.8	5.7	.340	.736
22	8	3.2	5.2	.514	.870
24	8	3.1	4.9	.617	985

[1] Each figure is an average of 2 tests, one with the single-face side up and one with the double-back side up.

of deflection and load in the conventional formula for center loading:

$$EI = \frac{PL^3}{48\Delta}$$

is shown by the curves in Fig. 7. The curves indicate that the resistance to shear increases with an increase in overhang.

A further study of these data to determine the amount of shear deformation resulting with different amounts of overhang was made using the more exact

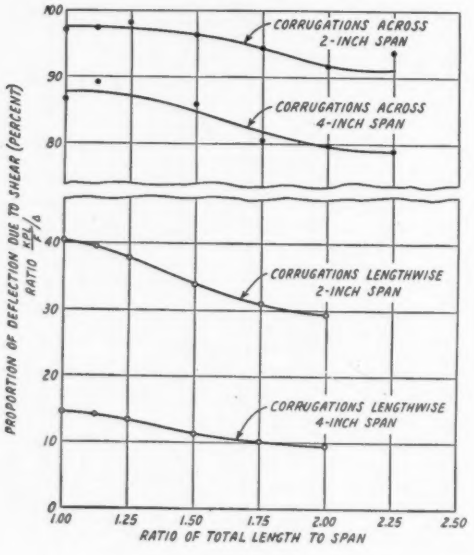

FIG. 8.

Influence of Overhang on Amount of Total Deflection Due to Shear in Bending Tests of A-Flute Corrugated Board Made of 0.016-in. Cylinder Kraft and 0.009-in. Straw Paper.

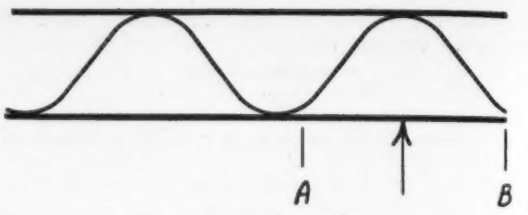

FIG. 9.

Side View of End of Specimen Showing Position of End Cut Which Would Result in Local Bending if Support is Between Points A and B.

formula previously mentioned. In these computations the equation for each overhang in a 2-in. span was combined with the equation in a 4-in. span that had the same ratio of total length to span. The results of these computations, which show the percentage of the total deformation due to shear, are shown in Fig. 8. The values for the ratio of total length to span of unity were obtained by extending the curves of Fig. 7 to the point representing no overhang and using the values of *EI* at these points as the basis for the computations. These values, if correct, would be free from the influence of overhang and should give the true values of *EI*. A rough check on these values can be made by neglecting the corrugations and calculating the value of E_b for comparison with the E_t, or modulus of elasticity, obtained from tension tests of the liners taken from this board. That a good correlation is obtained may be noted from the following tabulation:

	Machine direction Lb. per sq. in.	Across direction Lb. per sq. in.
E_b from bending tests with different overhang..... $\frac{EI}{0.000317 \text{ in.}^4}$	1,123,000	249,000
E_t for tension tests.....	993,625	245,000

The conclusion to be drawn from the study of overhang is that in making comparisons on the basis of bending tests of corrugated board consideration should be given to the amount of overhang and its relation to the span. In bending tests over short spans where the shear deformation is an important factor, a given amount of overhang would have a greater effect on the results than it would in tests over longer spans where the shear deformation is less of a factor. The ½-in. overhang used in the tests at the Forest Products Laboratory was based partly on the findings of the tests discussed here and partly on practical considerations.

In the original tests of specimens having corrugations perpendicular to the span it was found that with an overhang less than ⅓ in. there was likely to be local bending at the end depending on the position of the end cut with respect to the flute. This possibility is indicated in the sketch, Fig. 9, which shows the condition where a bearing at any point between *A* and *B* would result in a local bending of the lower liner. As the distance between tips of flutes in an A-flute board is approximately ⅓ in., it was considered necessary to use an overhang that would bring the bearing a little more than this distance from the end of the specimen. In addition a bearing plate about ⅝ in. wide was used on each support and also under the bearing block at the center. Such plates help to avoid local bending or crushing between the tips of the flutes both at the center and at the end supports so that the deflection measurements represent more accurately the bending of the

specimen as a whole. Although the illustrations, Figs. 1 and 2, show roller bearings on the supporting knife edges, polished metal straps like the one under the loading block at the center were found to be an acceptable alternative. As a further precaution against bending that may occur at the ends, it is suggested that specimens for test be cut either with a sharp power-saw or with a razor blade or other sharp instrument. The use of shears for this purpose is believed to cause incipient bending at the ends of the specimens that may affect the results.

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The Trend of the Newsprint Industry In the United States*

By George D. Bearce[1]

Abstract

The causes of the decline in the production of newsprint paper in the United States are explained. The methods and means by which management has endeavored to meet the competition of duty-free imports of newsprint are briefly described.

Newsprint is one of the important branches of the paper industry in the United States and is the third ranking grade in tonnage and value of product. It is a basic industry that employs a large number of men and furnishes to the newspaper publishers their important raw material, "white paper". The modern newsprint mill also represents a capital outlay of about $35,000 per ton of capacity for expensive machinery and equipment, as well as permanent buildings of the best industrial construction. A 300-ton mill is considered to be the smallest unit that will produce economically so the investment in a modern newsprint mill will be at least $10,000,000 without timberlands. Since a newsprint mill requires about a man per day per ton of paper this means that for each man employed an amount of about $35,000 must be invested as compared with the steel industry. The capital required per ton of product is higher than that of the steel industry which also uses very expensive and heavy machinery. An initial investment averaging $10,000 per employee is required to create a job in the steel industry, the American Iron and Steel Institute estimates. An average of $4,500 more is spent annually to maintain the job.

If the use of paper by a country is any measure of its economic and social development this nation should have a good rating because the per capita consumption of newsprint in the United States is the highest of any country in the world. The following estimates of the more important countries and their per capita consumption based on the consumption of 1936 were published in a News Print Service Bureau bulletin.

Country	Newsprint per capita, lb	Country	Newsprint per capita, lb
United States	57	Belgium	21
United Kingdom	55	France	18
Australia	53	Japan	13
Canada	33	Germany	11
Sweden	27	Italy	3
Argentina	26	Russia	2

The tremendous quantity of newsprint paper used in the United States and in the English speaking countries is the most striking feature of this comparison. During recent years the United States consumed about 3,500,000 tons annually.

About 2,000 daily and Sunday newspapers consume newsprint paper produced in the United States, Canada and from countries in Europe. These newspapers had a daily circulation of 41,000,000 copies in 1937, and this was an increase of about 2,000,000 copies compared to the year 1929. The Sunday circulation in the United States is estimated at 31,000,000 copies. The circulation curve of the United States newspapers has shown a gradual upward trend during the last 10 or 15 years, as might be expected due to the increase in population. The newspaper is still the most important institution in the United States as a medium for the distribution of news and advertising although in the past few years the radio has become an important feature in the advertising program of merchandisers.

Changes in the North American Newsprint Industry

The development of the newsprint industry has paralleled to a large degree the progress of the publishing industry in the United States. Twenty-five years ago the newsprint paper industry was a major factor in supplying the United States newspapers. In the year 1913 the tariff was entirely removed from newsprint paper and as a result many of the large manufacturers sought locations where they could obtain their pulpwood supply and power at a more economical figure. The large forest resources and the exceptionally fine water power sites, particularly in the provinces of Quebec and Ontario, provided an excellent and fertile field for this development. During the years that followed the removal of the tariff on newsprint there was a major movement of the newsprint industry into Canada where cheap power was developed and an ample supply of pulpwood was available. Other contributing factors in this change were that some United States newsprint mills had old machinery and plants as well as being poorly located with respect to power and wood supply. In some cases their power was more valuable for other industrial needs. A comparison showing the changes in the productive capacity of United States and Canadian newsprint paper indus-

* Presented at the Annual Meeting of the Technical Association of the Pulp and Paper Industry, Roosevelt Hotel, New York, N. Y., Feb. 19-22, 1940.

[1] Member TAPPI, General Manager, Maine Seaboard Paper Co., Bucksport, Me.

try as well as foreign imports is shown by the following figures:

Production			
	1913 (Tariff lifted)		
United States	1,300,000	tons	88%
Canada	350,000	tons	12%
Total	1,650,000	tons	
	1938		
United States	820,000	tons	22%
Canada	2,893,000	tons	78%
Total	3,713,000	tons	

Overseas imports were practically nil in 1913
Overseas 311,000 tons in 1938..... 8½% U. S. & Canada production

The Shift of Tonnage from the United States

As a result of the movement of the newsprint industry from the United States to Canada many of the smaller mills in the northern United States gradually rearranged their production so that they were no longer manufacturers of standard newsprint. The most rapid shifting of the industry has been since 1920, and during this period a large number of modern high speed and modern newsprint mills have been built in Canada. In 1926 there were 38 companies listed by the News Print Service Bureau as producers in newsprint paper in the United States. In 1938, 12 years later, there remained of these 38 concerns only 9 regular newsprint manufacturing companies. Five made some newsprint together with other grades of paper while the remaining 24 companies had either abandoned the manufacture of paper entirely or completely changed to other grades. There has only been one new newsprint mill established in the United States between 1926 and 1938.

During the last decade a major part of the newsprint industry in the United States has been virtually torn up by the roots and bodily moved to another part of the North American continent. The basic cause of the start of this movement was that newsprint was put on the free list in 1913 and came into the United States duty free ever since that date. It was also sound economics to establish the new and modern newsprint mills at the most advantageous location to make possible the production of this paper at low cost and increasing volume to supply the expanding demand. The result has been that the United States which was the largest producer of newsprint in the world at one time now ranks third since Canada and England both produce more newsprint than United States.

Engineering and Operating Improvements

In order that the remaining newsprint mills in the United States may compete with foreign plants it has been necessary to modernize them in every way possible. In some cases this has meant a major operation in building-over the paper machines and parts of the groundwood mill as well as the sulphite mill, and a rearrangement of the layout and flow of materials was essential. New and improved grinders have been developed and installed, hot acid circulating systems have been installed in sulphite mills and other methods devised to produce a better pulp at lower cost. In the paper mills the modern type of slice, suction couch and press rolls, electric drives, heat economizers and improved winders as well as many other types of modern mechanical equipment have been installed.

Some 25 years ago a speed of 600 f.p.m. was considered fast but most up-to-date machines now run from 1100 to 1300 f.p.m. Many mechanical, electrical, chemical, and other problems have been met and overcome during the period of this increase in the speed of paper machine operation. The collective efforts of the paper industry and the associated machinery manufacturers have been responsible for the remarkable development in the technique of papermaking.

Quality Improvements

During the past 20 or 25 years improvements in quality have been steadily attempted in the newsprint industry, and definite results have been attained in this field. Less than a decade ago the press room operators considered that satisfactory operating results were attained if they had only one break in every 3 to 5 rolls. At a conference in June, 1939, of the mechanical departments of the American Newspaper Publishers Association it was reported that one paper manufacturer's record showed that his paper averaged 50 rolls per break. This was based on a consumption of 600,000 rolls that were used on the presses over a period of 6 years.

Much has been done by the newsprint industry in the quality control of groundwood and sulphite pulps. This has enabled the mills to produce stock for the paper machines which in turn make a sheet of newsprint with the physical characteristics that are required. The more universal use of dandy rolls, smoothing presses, modern drying systems and other mechanical devices have all contributed to produce a more uniform and better sheet of paper.

Management Problems

The newsprint industry presents some exceptional problems for management, since the mills that make all of their own pulp should start to get their wood supply two years ahead of the time the newsprint rolls are delivered to the publishers' railroad siding. This requires not only careful planning for raw materials of all kinds as well as the manufacturing and delivery of the finished product but also the proper financing since the procurement of pulpwood necessitates an outlay of working capital when the wood production program is started. The correct management of sizable blocks of timberland is also important because of the fire hazards and possible destruction due to insect pests. The company owning large areas of timberland must manage them carefully in order to get a sustained yield and the best reproduction so that the forest resources will be maintained during and beyond the life of the pulp and paper mill. The technical advances in papermaking apply to newsprint as well as to other grades of paper. Many problems are presented to the newsprint industry and many changes must be made in order to keep up to date. Another particularly important problem that confronts management at the present time is that of personnel relations. While it is recognized that the present wage and hour laws and other governmental regulations covering industry are decreed by Congress it is sometimes difficult to convince the employee that he should not have special treatment or that he ought not to receive some exceptional consideration. The newsprint paper industry in the United States is and has been for some time largely unionized. The industry has been particularly fortunate in that the two principal unions with which it deals have international officers of experience and sound judgment who recognize the problems in the industry and advise their

members accordingly. They understand that the success of their union depends to a large degree upon the progress of the entire industry and its separate units and that a reasonable relationship must be maintained between wages, selling prices and profits if the industry expects to survive. The wage-rate in newsprint manufacturing is one of the highest in the entire United States paper industry and the average of the latter has shown a steady upward trend to the present time. The progress of pulp and paper mill wages is clearly shown in Table I which indicates that this industry is one of the best of many great industrial groups in the United States.

Price Trends

Newsprint is one of the lowest cost papers commonly used and its price influences many other similar grades of paper and in fact the whole price structure of the paper industry. Low-price newsprint (Fig. 1) came into existence upon the development of low-cost groundwood pulp about the year 1900. With the exception of a short period soon after 1920 when the supply was not equal to the demand, the price of newsprint paper has always been at a reasonable figure. As shown in Table I the price of newsprint from 1933 to 1936 inclusive was the lowest in the history of the industry, and even during 1939 the Eastern United States price was lower than in any

TABLE I.—NEWSPRINT PRICES, PULPWOOD COSTS & LABOR RATES

Year	Av. contract price newsprint f.o.b. mill, Value[1]	Domestic U. S. spruce pulpwood f.o.b. mill, value[2]	Wage rates, hourly earnings[3]
1913 (a)	$ 45		
1914	40	$ 9.45 (k)	.26 (Est.)
1915	38		
1916	48	9.35	
1917	60	11.98	
1918	60	15.38	
1919	74	17.20 (k)	.50 (Est.)
1920	105	19.97	
1921	103.75	21.68 (k)	.512 (Est.)
1922	70	18.11	
1923	75	18.20	.504
1924	74	18.21	.528
1925	70	17.87	.529
1926	65	17.38	.527
1927	65	17.11	.533
1928	60.70	17.04	.534
1929	55.20	16.79	.541
1930 (c)	55.20	16.38	.542
1931 (c)	50.20	15.14	.532
1932 (c)	41.80	12.65	.468
1933 (c)	35.30	10.56	.442
1934 (c)	33.20	10.18	.514
1935 (c)	33.20	10.20	.533
1936 (c)	34.20	10.54	.545
1937 (c)	36.10	10.88	.620
1938 (c)	41.60	11.32	.645
1939 (c)	41.60	11.60 (d)	.641 (b)

(a) Tariff on newsprint removed.
(b) 5 month average—National Industrial Conference Board.
(c) Prices changed from f.o.b. mill to delivered basis from 1930 to date—allowance made for average freight in calculating mill price. For 1938 & 1939 freight assumed to be $6.40 per ton.
(d) 6 months 1939.
References: [1] News Print Service Bureau.
[2] American Pulp & Paper Association—Pulpwood values.
[3] National Industrial Conference Board.
(k) Bureau of the Census
1913—$602 per year
1919—$1193 per year
1921—$1206 per year

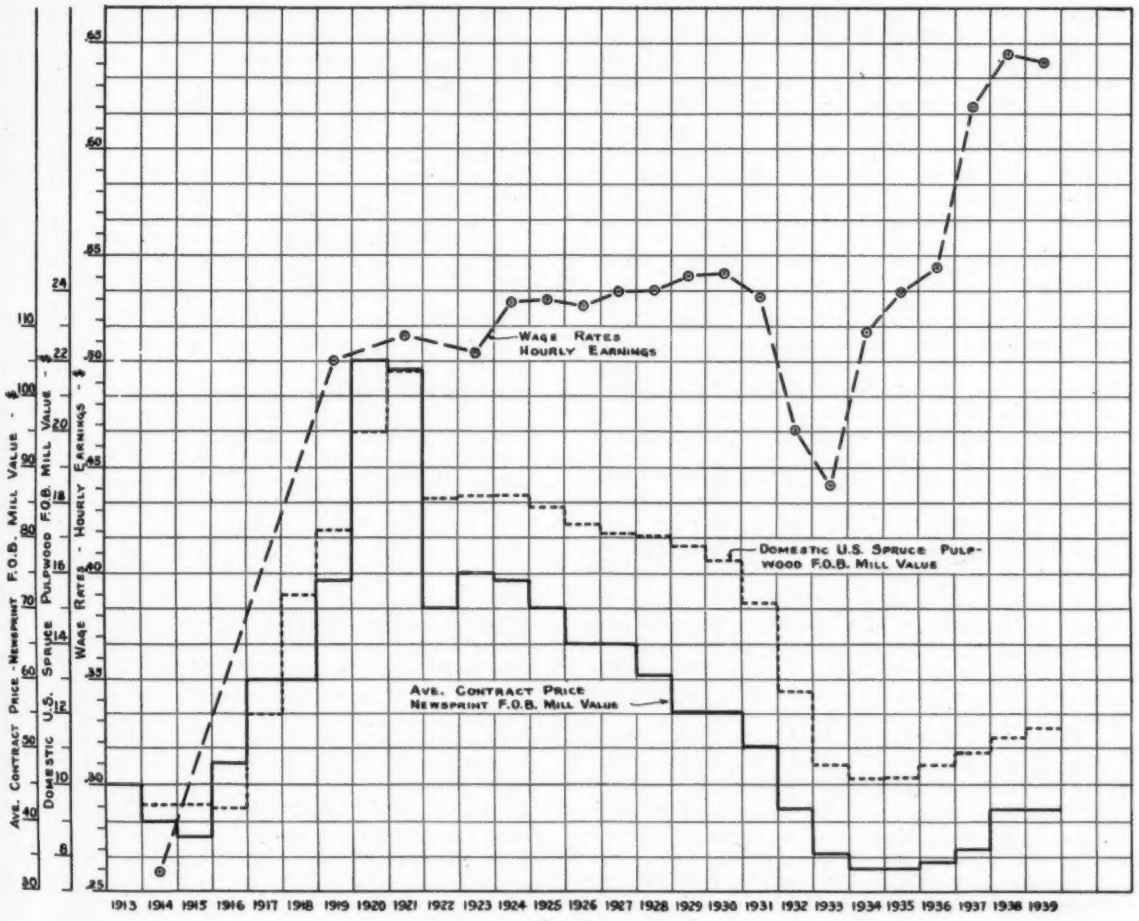
Wage Rates Hourly Earnings
Domestic U.S. Spruce Pulpwood F.O.B. Mill Value
Ave. Contract Price Newsprint F.O.B. Mill Value
Ave. Contract Price - Newsprint F.O.B. Mill Value - $
Domestic U.S. Spruce Pulpwood F.O.B. Mill Value - $
Wage Rates - Hourly Earnings - ¢
1913 1914 1915 1916 1917 1918 1919 1920 1921 1922 1923 1924 1925 1926 1927 1928 1929 1930 1931 1932 1933 1934 1935 1936 1937 1938 1939

Fig. 1.

year since 1913 with the exception of a period of 24 months during 1913 and 1914.

The important factors that influence the cost of newsprint are the cost of pulpwood and the wage rates in the industry. During the time when the price of newsprint was particularly high it is shown that the price of pulpwood was also at its peak value. The cost of pulpwood to the mills has gradually shown a downward trend along with the price of newsprint paper as indicated on Table I.

Becoming Increasingly Difficult

From the standpoint of management the problem of successfully operating newsprint mills in the United States is becoming increasingly difficult. The price of the finished product "newsprint" has not increased in proportion to wages and the raw products it requires in the manufacturing processes. While it is true that newsprint has advanced in price to some extent it is only a little over the break-even point. Wages (Fig. 1) have shown a steady upward trend except during the depression years and have more than doubled since 1913, while the price of newsprint is not much above 25 years ago. Pulpwood, the principal raw product, has followed market changes in most years but at present is proportionally higher and a more expensive item in the cost of the product than it was in 1913-14. Other materials have advanced during this span of years so that the net result has been an ever increasing cost of raw materials with no compensating increase in the price of the finished product. The increased taxation, wage and hour regulations, social security, old-age benefits and similar federal regulations and laws have all contributed to the problem of manufacturing newsprint at a profit. The demand of the consumer for a better and more uniform product has also been a factor in the increase of the finished paper cost since each new improvement usually requires special equipment or more expensive processing.

Near the Lowest Price in History

The combination of increased cost of pulpwood and other raw materials together with the high wage-rates have taxed the newsprint industry to develop every possible type of cost reduction in the manufacture of their product, since the present sales price of newsprint is very near the lowest price in history. On this account it is not surprising that the paper industry has moved from the United States, and the few mills that have remained are getting little or no return on their major investment. In a brief before the Interstate Commerce Commission in 1937 it was pointed out that the return on the investment was only a little over 1 per cent and that 58 per cent of the Canadian newsprint paper industry have been in financial difficulties. It should be recognized that any industry cannot continue if it is not profitable. Newsprint is and doubtless will be used for many years to come as a major raw product of the newspaper publishing industry. Foreign paper have been purchased from Sweden, Finland and other European countries at a price much below the prevailing market and even below the United States cost of production. The low wage-rates and cost of materials in these countries enables them to undersell United States mills at least $5 per ton thus creating a difficult marketing problem. There are times when this source is not entirely dependable, therefore, it is reasonable to expect that the consumer of newsprint industry will favor a reasonable degree of domestic product.

Met by Modernization

These problems have been met by the modernization of the industry and the development of more efficient manufacturing methods so that the newsprint paper industry can now be classed as one of the more progressive of our United States manufacturing establishments. Many mills have been abandoned and fallen by the wayside, and more may go in the evolution of the industry but progress will doubtless be ahead.

Newsprint from Southern Pine

A discussion on newsprint would not be complete without a few comments on the possible development of this industry in the south. A mill was recently completed in Texas, and it should be possible to determine the availability of the south for the development of the newsprint industry within a reasonable period of time. It may take 3 to 5 years to find out the economical way to make paper from southern woods that will equal the newsprint made from northern spruce. The cost of manufacturing this product and delivering to the market will also be a factor in the development of a southern newsprint industry. There are many technical and operating problems that will doubtless arise in connection with making newsprint out of southern pines. It should be possible to solve all of these problems in a reasonably economical manner but this may take considerable time to do it on a commercial basis. If and when one mill has definitely proved that this grade of paper can be made successfully and economically from southern pine, then the further development of the industry in the south will probably progress if good mill sites, ample pulpwood at reasonable cost, and economical power facilities are available.

Industry Is Fairly Stabilized

In general the newsprint industry in the United States is probably fairly well stabilized since the existing mills are reasonably well located, have a source of supply of raw products and are reasonably near the market. In Maine alone a recent survey estimated that this state has a supply of growing pulpwood that will last its paper industry for 41 years without considering normal reproduction, and Maine produces about 50 per cent of all newsprint made in United States. Unless there is an exceptional development in the newsprint industry in the south it is probable that the consumer of newsprint paper will be obliged to look for about 80 per cent of his supply in Canada and in foreign countries, because there is and always will be a disadvantage to United States newsprint manufacturers on account of the somewhat low wages, low cost pulpwood and materials in foreign countries. Canada has a large surplus of productive capacity and most of its mills are modern and efficient. Finland has greatly expanded its newsprint industry during the past few years and is now one of the most important sources of this grade of paper. The picture is not particularly interesting to the United States newsprint manufacturer, but the facts apparently indicate that the future trend points to a further contraction rather than an expansion of the industry in the years to come unless the deevlopment of newsprint in the south exceeds all expectations.

The Effect of Water Hardness on the Formation of Floc From Sodium Aluminate*

By Lewis B. Miller[1] and Ralph L. Lanz[2]

Abstract

An experimental investigation of the effect of water hardness upon floc formation from sodium aluminate in the more alkaline ranges of pH is presented. Where the water hardness is due primarily to calcium salts the effect is small in the range of pH investigated. Hardness due to magnesium salts, on the contrary, has a very pronounced effect upon the character of and conditions for floc formation from sodium aluminate. It is indicated also that under certain conditions the addition of magnesium salts to sodium aluminate in soft waters may be used to advantage in paper manufacture.

Water hardness is caused by the presence of soluble salts of calcium and magnesium, commonly present in the form of bicarbonates, sulphates or chlorides. It is well known in inorganic chemistry that mixing together comparatively concentrated solutions of sodium aluminate and of calicum or magnesium salts results in the formation of precipitates of complex compositions. A search of the technical literature appeared to indicate that no systematic investigation had been made of the effect of calcium and magnesium salts in concentrations such as are found in hard waters upon floc formation from sodium aluminate present in concentrations such as are used in paper manufacture. The present article presents the results of an experimental investigation of the reactions between solutions of sodium aluminate and of calcium or magnesium salts in the indicated ranges of concentration and in regions of relatively high *p*H.

A survey of the literature on water hardness in the United States was made in order to determine with some precision the range of hardness which it was desirable to investigate experimentally. A survey *(1)* published in 1934 shows that the average annual hardness of the larger public water supplies varies for the different states as follows:

STATES IN WHICH THE AVERAGE ANNUAL HARDNESS OF THE LARGER PUBLIC WATER SUPPLIES LIES WITHIN THE INDICATED RANGE

Hardness Range			
1 to 60 p.p.m. State	61 to 120 p.p.m. State	121 to 180 p.p.m. State	181 p.p.m. and over, State
Alabama	Arkansas	California	Arizona
Connecticut	Idaho	Colorado	Illinois
Delaware	Kentucky	Florida	Indiana
Georgia	Louisiana	Michigan	Iowa
Maine	Montana	Minnesota	Kansas
Maryland	New Jersey	Missouri	Nebraska
Massachusetts	New York	Nevada	New Mexico
Mississippi	Pennsylvania	Ohio	North Dakota
New Hampshire	Tennessee	Oklahoma	South Dakota
North Carolina	Vermont	Texas	
Oregon	West Virginia	Utah	
Rhode Island		Wisconsin	
South Carolina		Wyoming	
Virginia			
Washington			

These data represent average values. Many individual values range up to 1000 p.p.m. of hardness and a small percentage considerably exceed even this value. An arbitrary and moderately dilute solution of sodium aluminate (from the paper manufacturing viewpoint) was therefore chosen (410 p.p.m. of sodium aluminate in distilled water) and to this was added calcium or magnesium salts in small increments up to concentrations of about 5000 p.p.m.

Experimental Results

In order to avoid the complications which would result from the independent precipitation of hydroxides or hydrated oxides of calcium or magnesium, a short preliminary investigation was first made so that conditions would be chosen such as to avoid these complications. A solution of 410 p.p.m. of sodium aluminate was found to have a *p*H of approximately 10. At this *p*H there is no difficulty from the precipitation of calcium hydroxide in the ranges of concentration studied since this compound at saturation *(2)* possesses a concentration of 2643 p.p.m. and a *p*H of well over 12.

Hydrated magnesium oxide precipitates at much lower concentrations and at lower *p*H values than does calcium hydroxide. An electrometric titration of a solution of 1230 p.p.m. of magnesium sulphate heptahydrate was therefore made with sodium hydroxide. The titration curve obtained is given in

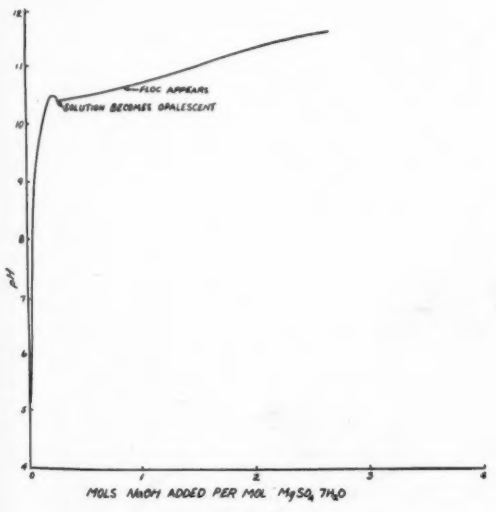

FIG. 1.
1230 P.P.M. Magnesium Sulphate Solution Titrated by Sodium Hydroxide.

* Presented at the Annual Meeting of the Technical Association of the Pulp and Paper Industry, Hotel Roosevelt, New York, N. Y., Feb. 19-22, 1940.

[1] Member TAPPI, Chemical Engineer, Keasbey & Mattison Co., Ambler, Pa.; Chairman, Water Committee of the Engineering Division of TAPPI.

[2] Chemist, Keasbey & Mattison Co., Ambler, Pa.

Fig. 1. Hydrated magnesium oxide under these conditions begins to precipitate at a *p*H of 10.40. The small loop in the titration curve preceding the first appearance of opalescence probably represents a condition of supersaturation. The first appearance of a solid phase occurs at a *p*H of 10.40 where the solution becomes slightly opalescent. The opalescence increases with further additions of alkali but it is not until a *p*H of 10.65 is reached that coalescence into a floc occurs when the well stirred solution is permitted to stand for 5 minutes. The floc formed is finely divided and very slow to settle. For the immediate purpose of this investigation the important point is that hydrated magnesium oxide does not precipitate until well above the *p*H of the chosen sodium aluminate solution. Any precipitate or floc which forms is, therefore, not due to the effect of the alkalinity of the aluminate solution on the solution of magnesium salt.

These points having been established, solutions containing 410 p.p.m. of sodium aluminate were next subjected to electrometric titration with salts of calcium and magnesium.

In Fig. 2 is shown the curve resulting from the electrometric titration of sodium aluminate with calcium chloride. A dip in the titration curve which increases rapidly up to additions of 110 p.p.m. of calcium chloride (taken as $CaCl_2$) suggests that a chemical reaction is occurring between the sodium aluminate and calcium chloride. No solid phase separates throughout the course of the titration. After standing for a number of days the titrated solution containing an excess of calcium salt showed the separation of a few small crystals which may have been crystals of calcium aluminate. This late separation of a small quantity of solid phase is of no immediate importance from the standpoint of paper manufacture.

In Fig. 3 is presented the electrometric titration curve representing the titration of sodium aluminate by magnesium sulphate. The curve shows a dip on the addition of small amounts of magnesium sulphate, similar to that found when calcium salts are added to aluminate solution, suggesting that there is a chemical reaction between the magnesium salt and the aluminate. In addition, a solid phase begins to form as indicated by the appearance of opalescence at a *p*H of 9.95 when 33 p.p.m. of magnesium sulphate (expressed as $MgSO_4$) has been added to the solution containing 410 p.p.m. of sodium aluminate. At a *p*H of 9.75 floc formation occurs with the addition of 82 p.p.m. of $MgSO_4$. When a sodium aluminate solution containing 410 p.p.m. of aluminate is titrated by acid, floc formation begins at a *p*H of 9.60. The above observations, therefore, further indicate that a specific reaction is occurring between aluminate solution and magnesia "hardness" which induces floc formation. This floc appears in larger particles than those noted when magnesium hydrate is precipitated by the interaction of magnesium sulphate and sodium hydroxide and settles somewhat more readily than the latter floc. It is not as coarse nor does it settle nearly as rapidly as does a typical "alum floc" from solutions of equivalent concentration.

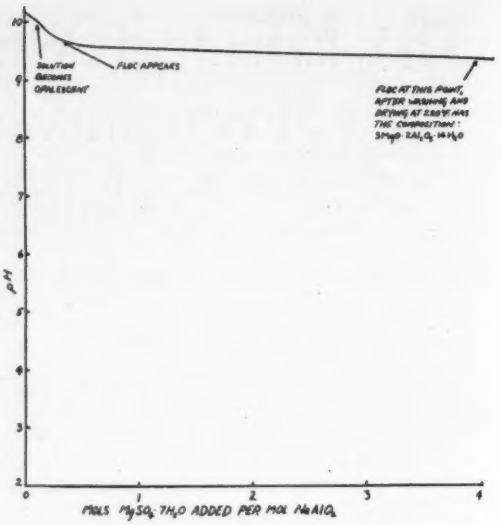
SOLUTION BECOMES OPALESCENT
FLOC APPEARS
FLOC AT THIS POINT, AFTER WASHING AND DRYING AT 220°F HAS THE COMPOSITION:
pH
MOLS MgSO4.7H2O ADDED PER MOL NaAlO2

FIG. 3.

410 P.P.M. Sodium Aluminate Solution Titrated by Magnesium Sulphate.

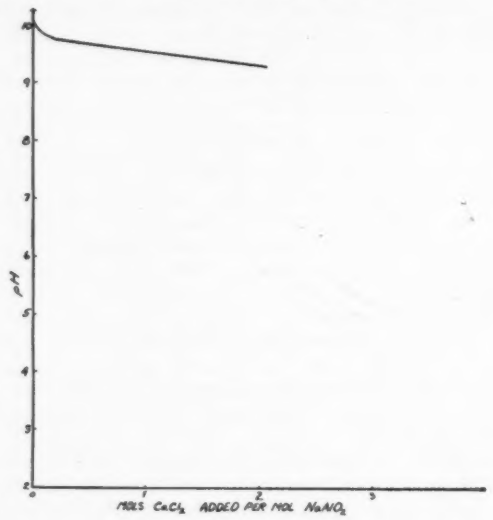

FIG. 2.

410 P.P.M. Sodium Aluminate Solution Titrated by Calcium Chloride.

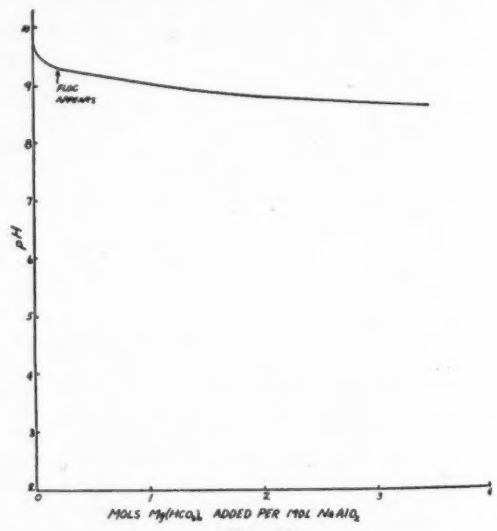

FIG. 4.

410 P.P.M. Sodium Aluminate Solution Titrated by Magnesium Bicarbonate Solution.

The floc formed at the end of the titration when approximately 2400 p.p.m. of magnesium sulphate had been added to 410 p.p.m. of sodium aluminate was thoroughly washed to remove all soluble salts, dried at 220 deg. F. and analyzed. The composition of the dried floc may be represented by the formula 3 MgO.2 Al_2O_3.14 H_2O. Whether this composition represents a true compound or whether the floc may vary in composition with conditions of precipitation, in which case the molecular ratio noted is purely accidental, is not known.

In Fig. 4 is given the electrometric titration curve resulting from the titration of a solution of sodium aluminate containing 410 p.p.m. by a solution of magnesium bicarbonate. No opalescence occurs preceding the appearance of floc as was the case where magnesium sulphate was used. Floc formation occurs at a *p*H of 9.3 and upon the addition of 151 p.p.m. of magnesium bicarbonate expressed as Mg $(HCO_3)_2$. At first this floc is rather finely divided and slow settling but upon the addition of further quantities of magnesium bicarbonate a coarse, rapid settling floc is formed.

Discussion

The results obtained in this investigation are purely of a preliminary nature and cover only a narrow range of *p*H. Investigations covering a number of concentrations of sodium aluminate and a greater range of *p*H values should be made in order to cover this subject more fully, and the writers of this article hope to extend this work at some future date. The present results indicate very clearly, however, that the hardness of the water used in paper manufacture may have a decided influence upon aluminate flocculation. This is particularly true where the hardness consists of an appreciable percentage of magnesium salts, for these salts have been shown to have a pronounced effect upon the *p*H range of flocculation and the character of the floc formed from sodium aluminate.

The fact that alum floc, formed from filter alum, may be influenced in character and in conditions for formation by the presence of other soluble salts is not new. It was demonstrated a number of years ago that the type and concentration *(3)* of anions present have a marked influence upon the formation of floc from filter alum. More recently an important series of investigations *(4)* have indicated that the character and conditions for formation of alum floc may be markedly affected by the presence of small quantities of partially acidified sodium silicate. The present investigation indicates that the character and conditions for formation of floc from sodium aluminate may similarly be affected by the hardness of the water supply, particularly where the hardness contains appreciable percentages of soluble magnesium salts. It has been demonstrated that concentrations of magnesium salts such as are met in moderately hard waters are sufficient to produce these effects. Conversely, the addition of small quantities of magnesium salts to soft waters to which sodium aluminate has been added may sometimes be used to alter the character or conditions for formation of floc from sodium aluminate. Judicious use of this principle will assist in the control of floc formation from aluminate.

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Newsprint Made from Red Pine

The first newsprint paper from red pine has just been produced at the New York State College of Forestry, Syracuse University, according to Professor W. Oury Hisey of the Pulp and Paper Department. He also states that this is the first time that the entire process of paper making from seedling trees to finished product has been carried on entirely by an educational institution.

The red pine trees from which the paper was made, were planted by students, grown on college land, harvested by students and manufactured into pulp and finally into newsprint in the laboratories of the college. "This red pine newsprint", says Professor Hisey, "is destined to be used by the *Daily Orange*, the student newspaper of Syracuse University, thus completing the cycle of all-student activity connected with the production of the paper."

Professor Hisey states that the red pine wood came from trees which were planted in 1915 on the land of the New York State Ranger School, a branch of the College, at Wanakena, N. Y. The site of this planting previously had been commercially logged and had the misfortune to have been burned over in a subsequent forest fire. In spite of the poor condition of the soil the planted trees grew to a height of 35 to 40 feet, and a diameter of 6 to 10 inches in twenty-three years, and the average stand of timber is now about 23 cords an acre, giving an annual growth of approximately one cord per acre per year. This growth is practically as good as that obtained from pines in the south and indicates that the production of a forest crop for paper in New York State is not an idle dream. Only thinnings from this planted forest of red pine were used.

Professor Hisey says that the wood, after felling and peeling by the students of the New York State Ranger School was shipped to Syracuse and there transformed into pulp in the laboratory of the Department of Pulp and Paper Manufacture, the operations being a part of the training given to students in the College of Forestry. This laboratory is a complete pulp and paper mill, and contains equipment for all processes of converting wood into paper. The pulp produced by the ground wood process, was converted into paper on the semi-commercial paper machine, and a high quality newsprint was made from a material hitherto not used for this purpose.

"This demonstration of the feasibility of converting red pine into newsprint," says Professor Hisey, "is only one of several similar projects under way at the College of Forestry. Such projects have for their object the discovery of new raw materials for the big paper industry of the State of New York, and the development of economic integration of timber production and timber usage in the State."

Modified Casein and Caseinates

Modified caseins and caseinates are described in a 47-page booklet issued by the Casein Company of America, 350 Madison avenue, New York. The manufacturer states that its Protovac modified caseins and caseinates have new and different properties than regular caseins, due to the remanufacturing process used.

P. W. Lesh Heads Paper Trade Association

The National Paper Trade Association of the United States held its Thirty-seventh Annual Convention at the Waldorf Astoria Hotel, New York, February 19-22 At the annual meeting on Thursday the following officers were elected: President, P. W. Lesh, C. P. Lesh Paper Company, Indianapolis, Ind.; vice-president in charge of Fine Paper Division, J. H. Brewer, Storrs & Bement Company, Boston, Mass.; vice-president in charge of Wrapping Paper Division, C. E. Roach, Capital City Paper Company, Springfield, Mass.; treasurer, C. W. Vernon, Vernon Bros. & Company, New York; executive secretary, A. H. Chamberlain, 220 East 42nd street, New York.

President Jamison's Address

I am proud to have the honor of calling to order the 37th Annual Convention of The National Paper Trade Association. The Association has always meant a lot to me, many fellow members are my best personal friends and I feel that such friendships of my own and many others in our membership should be credited to the Association because they originated and were built up and cemented in our periodical Association contacts and in our mutual participation in Association activities. I have always received a lot of benefit from the organization and I have been many times repaid for whatever I may have contributed to it and whatever work I have done.

As we meet again for our big event of the year, I welcome you as your President but look forward to my early relief from this difficult position. We are all to be congratulated on this splendid attendance and the fine program that has been prepared. We are indebted to all who have contributed to it and have consented to take part in it.

The manufacturers and guests who have accepted our invitation to attend this meeting are cordially welcome. Many of them were with us a few months ago at our Fall Convention in Chicago. At that time we faced a situation in our industry which threatened widespread disturbance and serious results. We took advantage of that occasion to steady each other, pool our ideas and experience and take a clear sighted view of the situation and outlook. I shall always feel that the meeting then held and the publicity given to counsels of sanity and conservatism had a great influence in preventing speculative excesses and price advances and keeping our industry on an even keel. Had not such wise counsels prevailed and cautious policies been adopted, our situation would be much less healthy and comfortable today.

Conditions now are greatly changed. We have found that the mills could make all the paper we needed and no one is worrying how he is going to fill his orders. But we are not falling down from a false level, business is still reasonably good and the outlook for 1940 is fairly satisfactory. The year may still hold surprising developments. The War unfortunately is still going on and no one can predict what may be its effects in this country or its results to the world. All we can do is to continue to operate in a sound, conservative way, remembering that the more we depend on each other and share with each other the better we shall come through.

The opening of our Convention is always a little like Old Home Week, reminding us of many similar occasions and those whose wisdom and generous leadership guided our activties in former years. We are fortunate and happy that many of them are with us still and we always appreciate a word of greeting or counsel from familiar voices at this time. I know you will be glad to have me call on several that I happen to see in the room.

At the opening session on Monday, Arthur A. Hauk, president of the University of Maine was the featured speaker and in his address said, that the stability of the paper business and the perpetuity of our form of government cannot be insured by science and technology alone, that to train youth as efficient producers of material wealth is not enough, but more than ever before we need men and women of in-

PERRY W. LESH, President

A. H. CHAMBERLAIN, Secretary

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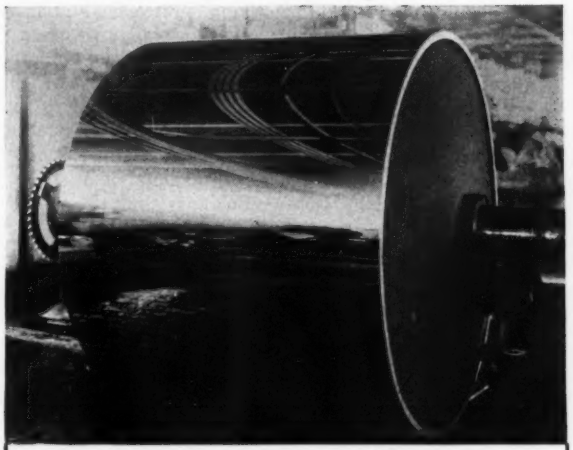
Improving finish. Because of its permanently hard, smooth surface, CRODON-plated equipment can turn out a product to far more accurate specifications and with a more perfect finish. If the finish of your product is vital to its success CRODON-plating your equipment will help you achieve a more perfect finish — quicker—and at a lower cost of production. Chromium is the **hardest** commercial metal and because of this will give your equipment an extremely hard, **smooth** corrosion-resisting surface.

Cutting maintenance costs. CRODON-plating reduces the frequency of repairs and replacements and expensive delays incident thereto. Its hard, easily cleanable surface insures economical, long-lived service — keeps your equipment running longer, more efficiently—by drastically reducing the amount of valuable production time necessary for overhaul and repairs.



6 ton welded steel drum; diameter 6 feet; face 5 feet — face area, 13,570 square inches. CRODON-plated and polished to a high lustre finish to insure a better product.

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tegrity, understanding, tolerance, courage and faith. The speaker pointed out that one of the most devastating results of the depression has been the dimming of our traditional faith and courage, our loss of morale. If the courage and faith of our young citizens would be weakened our vision of a great America would pass into an eclipse. One can understand the discouragement that grips us as older people. We have plenty of troubles and the end of them is not in sight. We are not going to help matters however, by giving up to despair. It isn't sporting to tell our youth that the glory of America is past and that there is nothing for them to contribute to national survival and progress. Yet that is the story that they are hearing from many sources.

The University of Maine has long been closely identified with the paper industry. It was among the first to offer undergraduate courses in pulp and paper technology and today more of its technical graduates are employed in the paper industry than in any other single business enterprise. We are proud of the services they are rendering in various capacities in all parts of the country.

The American youth of today have courage and idealism. They don't abandon hope easily. Most of them come to maturity when a smaller proportion of the population find places in industry, commerce, and the professions. An exhaustive study of this problem has been made by the American Youth Commission of the American Council on Education, a non-partisan, non-sectarian, non-governmental, voluntary organization. The members of the Commission include leaders of business and the professions, and Owen D. Young is vice-chairman. It is not pleasant to learn from their reports that 4,000,000 young men and women are idle, that one-third of all unemployed workers in the United States are between the ages of 15 and 24. But it is encouraging to know that a vital problem is being so carefully considered. The findings of the Commission are significant, not only because of the constructive recommendations but because of the information which has a bearing on planning for education and industry. For example, if present population trends continue, it is estimated that we shall have almost 2,000,000 fewer persons between the ages of 15 and 19 in 1950 than we have now. Doesn't this fact suggest that it is tremendously important for us not to permit our human resources to be wasted?

I know you will be impressed by the necessity for following the recommendations if you agree with the Commission that "National survival and progress look inevitably to the future," and must be concerned primarily with the young people who will be the America of the future.

"Morale is built not only by accomplishment but by hope," Dr. Hauck quoted from the report. You know that is true in your business ventures. No new enterprise succeeds unless there is among the leaders a morale that is built by hope. It is strikingly true in the case of the young. I have talked with many young job-seekers. What many of them tell me reflects great credit upon the business men of our country.

Dr. Hauck thanked the paper industry for the courtesy with which it listens to young job-seekers, who, though they find no job immediately, are not discouraged. "When you as business men show that kind of interest you are building morale," he said.

"The adjustment of youth to the complexities of modern life is not easy," Dr. Hauck continued. "They must be strengthened by the morale that comes from hope. The surprising thing to me is not that some fail but that so many succeed. We of our generation have a great obligation to them, not the least of which is setting an example of courage, of maintaining, particularly in places of leadership, a high morale.

"The dictators did not wait for the recommendations of a Youth Commission. Hitler has said: 'Whoever has youth has the future.' It is a tragedy for the world that he has captured the energy and idealism of German youth. Many travelers who returned from Germany before the war spoke of the bewilderment of older people, their feeling of shame and humiliation in connection with the racial and religious persecutions. But German youth seems sure of its destiny. There were no protests from them, no feeling of doubt about the Nazi program. How did Hitler capture their interest and enthusiasm? He told them their situation was hopeless under a democratic form of government. Because of their low morale they became his willing tool in the destruction of fundamental personal rights which we consider indispensable for decent living. Can we be sure that our jobless youth, if the future seems too discouraging, will not be exploited by those who would tear down American institutions?

"If we really believe in democracy we must have confidence in it and we must make it work. This is not easy. Of democratic government Lord Bryce one said: 'No government demands so much of its citizens and none gives back so much.' The demands upon the loyal citizen are greater today than for many generations. Ideals which we thought had general acceptance are being attacked. Our system of self-government and competitive private enterprise are said to be ineffective and outmoded in this age of science and industry. Individual rights are scoffed at, tolerance is supplanted by doctrines of racial superiority.

"To face the dangers which confront us and yet not surrender our faith is one of the principal requirements of our time. There are weaknesses to be strengthened, mistakes to be corrected, but no matter how serious the present situation we must have confidence that there will be a brighter tomorrow.

When we go back to the fathers we discover no golden age of ease and plenty. We find they had their troubles, yet obstinately insisted upon looking forward to a better day. Shall we admit that we haven't faith that intelligence and courage will preserve for our children the things in our civilization which mean most to us?

Paul T. Truitt, chairman, Interdeparmental Committee on Interstate Trade Barriers, speaking at the Monday session urged the association to take steps to aid the movement for the elimination of interstate trade barriers, and suggested a seven-point program as follows:

1. Study the present laws relating to commerce in your city and state.

2. Watch all bills relating to commerce introduced into any session of your city council or state legislature.

3. Read all publications dealing with the many phases of the trade barrier problem—a bibliography

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- Limited
- Milky Way
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- Barrel Covers
- Box Liners
- Butter Wrappers
- Celery Wrappers
- Crinkled Parchment
- Egyptian Parchment Bond
- Fish Wrappers
- Greeting Parchment
- Ham Jackets
- Ham Wrappers
- Ice Cream Can Squares
- Ice Cream Brick Wrappers
- Lard Carton Liners
- Margarine Wrappers
- Milk Bottle Hoods
- Milk Can Gaskets
- Pork Loin Wrappers
- Poultry Box Liners
- Poultry Wrappers
- Sausage Wrappers
- Shredded Parchment
- Shortening Carton Liners
- Soap Wrappers
- Tamale Wrappers
- Tub Liners
- Vegetable Crate Liners
- Vegetable Wrappers
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- KVP
- Puckered Whalehide
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- Kalafilm (Washable) Shelf Paper
- Paper Dish Rags
- Papricloth Sheets
  - Embalmers
  - Obstetrical
  - Surgical
- Pie Tapes
- Self Cleaning Wash Cloths
- Shower Mats
- Surgical Waxed

TRADE NAMES

- KVP
- Mrs. Hayward's

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- Box Liners
- Bread Wrappers
- Butter Protection
- Candy Bar Wrappers
- Carton Sealing
- Cereal and Cracker Box Wrappers
- Delicatessen
- Dry Waxed
- Extra Transparent
- Fruit Wrappers
- Insulator Paper
- Self Sealing
- Shredded Waxed
- Soap Wrappers
- Waxed Glassine
- White Oiled Paper

TRADE NAMES

- D-O-K
- Double Royal White
- Insulator
- Isyn-Gloss
- Kalafilm
- King's Seal
- Print-O

WRAPPING PAPERS

- Christmas Wrapping
- Embossed Wrapping
- Fruit Liners
- Fruit Wrappers
- Gift Wrapping Paper
- Laundry Papers
- Market Papers
- Store Wrapping
- Tomato Wrappers

TRADE NAMES

- D-O-K
- Garcia Gold Standard
- Gold Standard
- KVP
- Klothwhite
- Market
- Prosperity Waterproofed
- Steak Interleaving
- White Eagle Waterproofed

has been prepared by the Department of Commerce and is free to those who ask for it.

4. Once having determined the barrier aspects of a given law or proposed bill, take up the points of issue emphatically with all members of your city or state legislative representation.

5. Cooperate with the administrative branch of your city or state government. Report to it pertinent facts about trade barrier laws already passed or bills about to be enacted.

6. Talk about this subject among your friends, clubs, business associates, business organizations, civic groups, or other gatherings through which information you have developed may be broadcast.

7. Urge the consideration and adoption of proper trade barrier resolutions by any convention which you may attend. The intelligent use of factual publicity is a potent weapon with which to fight against the trade barrier evil.

We are already deeply enmeshed in a vicious circle, Mr. Truitt declared. From our experience with international tariffs, we have learned that it is difficult to turn back once we have gone too far. Economic fixation, difficult to alter, forms around a given policy or law. Interests grow up and become vested. With the foreign trade problem what it is today, is it not far more important than ever before that we restore free trade, in practice as well as in principle, among the states? Outstanding now is the opportunity which, once neglected, may not soon reappear, for business men, concerned with these discriminatory laws as I know you are, to display a new brand of business statesmanship, exhibiting a non-partisan vision of American domestic commerce, which transcends all forms of local transitory protectionsim.

An intolerable situation is being created in the United States by barriers to trade which have been raised between the states.

A barrier enactment usually involves the abuse of the sovereign power of a state, by a small group, through the state's own legislature, which tends to secure an advantage for the people, products, or services of groups within that state, or for the state as a whole, at the expense of similar interests in a sister state. Such abuse necessarily contravenes the proper exercise of the sovereign power of the state in matters relating to the legitimate use of police power to protect public health, public morale, and the general public welfare. In many cases, commercial advantage is sought and obtained under the guise of the proper exercise of vital state police powers. In many other cases, pressure groups force the abuse of state legislative power to grossly and flagrantly obtain commercial advantage, and appear not unwilling to discriminate against the people, products or services of other states.

The services of the merchant trucker have for many years been an integral part of our distribution system, especially of farm produce. Yet today there is in effect a maze of discriminatory rules and regulations applying to this method of doing business. These enactments are designed to protect resident vendors against transients, or competition from neighboring producing areas.

Norton Men Honored

Three Norton company men have been designated by the National Association of Manufacturers to receive awards for outstanding inventions and research. They are Thure L. F. Larsson, Mechanical Engineer at the Greendale plant; Elmer C. Schacht, vice-president of Norton Company subsidiary, Behr-Manning Corporation of Troy, N. Y.; and Raymond R. Ridgway, director of abrasive Research, Norton Company, Chippawa, Ontario.

Mr. Ridgway will receive his award at a regional dinner in Rochester, February 19, Mr. Larsson at the Copley-Plaza in Boston, February 20, and Mr. Schacht at the Waldorf-Astoria in New York, February 27.

These awards, known as a part of the Modern Pioneer program in observance of the 150th anniversary of the founding of the American patent system, have been determined through the cooperation of manufacturers, executives of manufacturing trade associations and members of professional, scientific and engineering societies in a search for the unsung heroes of the workshop and laboratory worthy of recognition.

Records of achievements of nominated inventors were submitted to a committee of awards made up of President Karl T. Compton of Massachusetts Institute of Technology, chairman; Forest R. Moulton, permanent secretary, American Association for Advancement of Science; George B. Pegran, dean, Graduate Faculties of Columbia University; John T. Tate, dean, College of Science, Literature and the Arts of the University of Minnesota; Edward R. Weidlein, director, Mellon Institute; Frank C. Whitemore, dean, School of Chemistry and Physics of Pennsylvania State College.

To be eligible for nomination, an inventor or research worker must have discovered or invented "an art, machine, manufacture, or composition of matter, or useful improvement thereof" upon which the United States Patent Office has issued a patent within the last 25 years and which has been put into use by industry and through such use has been created increased employment, provided a new commodity or service, reduced the cost of a product already in use or improved quality of a product already in use.

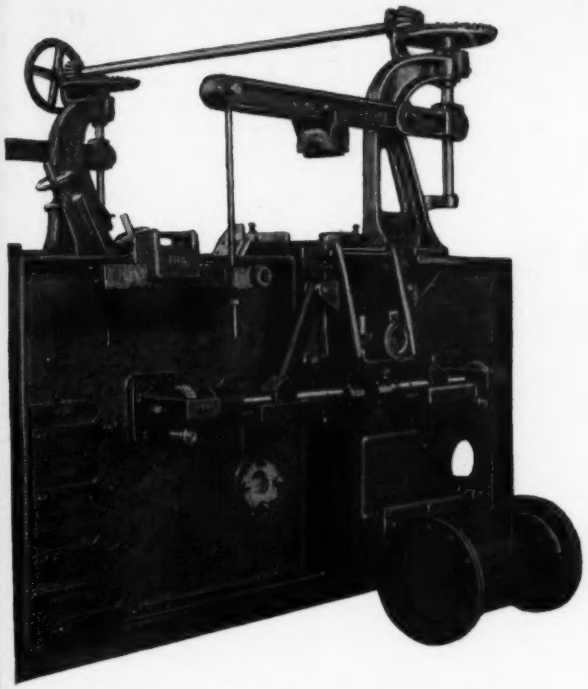
New Dietert Moisture Teller

The Harry W. Dietert Company of Detroit, Mich., has added a new size moisture teller to its line of moisture tellers. The new addition is a moisture teller that takes a sample pan 2¾ inches in diameter and 1¼ inch in depth.

The bottom of the sample pan is made of 500 mesh monel filter cloth. The sample pan containing the sample to be dried, is placed under the heated air outlet of the moisture teller. The air being above the steaming point of water causes the moisture contained in the sample to be flashed to steam and blown through the bottom of the pan. The sample is dried to constant weight in as short a period as one minute for many materials.

The pan containing the sample is light and may be weighed on a sensitive analytical balance for accurate moisture determinations.

The temperature of the drying air is automatically controlled by means of an adjustable thermostat.



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Obituary

William Salzer

William Salzer, president of the William Salzer Company, Inc., Chrysler Building, New York, died February 9 in the Lenox Hill Hospital after a brief illness in his 56th year.

Mr. Salzer was born in Austria and was a graduate of the College of the City of New York, Class 1906. He began his long career in the paper industry with the Republican Bag and Paper Company, Inc. of which he was vice president and sales manager for a long number of years. Prior to his forming his own company in March, 1938, he was vice president and general manager of the Metropolitan

WILLIAM SALZER

Paper and Bag Corporation which was formed by him at the time of the merger of his company with the National Consumers Paper Corporation.

He had an attractive personality and was a much respected and loved gentleman. The expressions that have come in from the mills with whom he had done business for a great many years, as well as the houses to whom he had sold, have all testified to the very high esteem in which he was held for his sincerity and firm but humanly warm quality of giving his utmost to the industry in which he had put his entire heart and soul.

Charles H. Hornbeck

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., Feb. 19, 1940—Charles H. Hornbeck, who had been associated with the paper industry most of his life, died at 3:15 Wednesday afternoon, February 14, at his home at Appleton. He was 71 years old and had been ill for several weeks.

Mr. Hornbeck was born July 27, 1868 at West Newton, Pa., and had lived in Appleton since 1913. He was superintendent of the Frank Gilbert Paper Company, Waterford, N. Y. from 1894 to 1912, and of the Atlas Paper Company, Skanesateles, N. Y. from 1912 to 1913. From then until his retirement in 1929, he was with Kimberly-Clark Corporation at its mills at Neenah and Appleton, Wis., as superintendent and mill manager. He is survived by his widow, a daughter, Mrs. Louis Nabbefeld, Appleton, a son, William, Appleton, and two grandchildren.

Mr. Hornbeck was a member of the Masonic lodge of Waterford, N. Y. and of the Elks Lodge at Appleton.

Funeral services were held Friday afternoon, February 16, at Appleton, with Dr. Henry C. Culver, pastor of the First Methodist Church, in Charge. Burial was made in Riverside cemetery, Appleton.

James E. Myers

James E. Myers, connected for about 50 years with the paper industry in New England, died February 3. Mr. Myers for the past few years had been part of the Rockwood Paper Company, Boston, Mass., and made his residence in Quincy.

To Promote Sale of Cordova Cover

A unique campaign has just been launched by the Detroit Sulphite Pulp and Paper Company to promote the sale of Cordova Covers and Bristols.

This campaign is built around the "Cordova Idea File", a portfolio of cover designs which can be used to practical advantage by printers and printing salesmen. This file has been prepared to assist in developing ideas for inexpensive designs for catalogs, menu covers and other printed pieces. It offers suggestions for the selection of type, rules, type ornament and inks that can be combined to form harmonious cover designs without the necessity of resorting to the use of art work or engravings. It is intended to help eliminate extra time and effort that may be wasted in the composing room in working out ideas for various jobs. It will provide samples that can be submitted to the printer's customers as basic ideas that can be altered to suit various copy requirements or other individual needs.

The "Cordova Idea File", in its introductory form, contains six entirely different types of cover designs inserted in an attractive portfolio especially suited for the printer's files. To secure additional designs which can be distributed at regular intervals and to create interest in the Idea File and in Cordova papers, a series of contests are being started to secure outstanding designs from the best compositors employed by printers throughout the country.

The entire Cordova campaign has been planned by and is under the direction of Charles M. Gray and Associates, Detroit advertising agency.

Stow Mfg. Co. To Make Whirlflex

All rights to manufacture and sell Whirlflex, a mechanical cleaner for piping in paper mills, have been acquired by Stow Manufacturing Company, Inc., Binghamton, N. Y. The transaction was negotiated with the Whirlflex Company, Buffalo, N. Y., which holds all patents to the device. The Stow Manufacturing Company is now in production on Whirlflex and is planning a promotion program in various countries throughout the world, excepting Canada. Whirlflex employs a flexible shaft drive to revolve the cleaning member of the device.

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Many years of experience and efficient methods have made us a long list of satisfied customers, and enable us to quote reasonable prices.

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UNION MACHINE CO.

FITCHBURG MASSACHUSETTS

HERE'S A *trouble-saver* IN ANY MILL

When the stock starts coming out of the machine offweight, you've got to do some adjusting back along the line. And sometimes a lot of broke stacks up before you get back to the trouble. Plenty of headaches develop, too, when jordans start acting up or screens fail to work at top efficiency. Check back and you'll find a big share of these troubles can be laid to the fact that consistency and uniformity of slush stock cannot be adequately regulated through the various stages of processing and production. And here's a real cure for that. The new improved Meyers Consistency Controller, installed at any stage of the operation, will maintain stock density within one-eighth of one percent. Let us tell you how we can save you trouble—and money. Write today for information.
PROCESS CONTROLS, INC.
MEYERS EQUIPMENT
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PROCESS CONTROLS, INC., LEROY, N. Y.

FINANCIAL NEWS

New York Stock Exchange

High, Low and Last for the Week Ending February 21, 1940

	High	Low	Last
Armstrong Cork Co.	40¾	40	40
Celotex Corp.	12½	11¼	11¼
Celotex Corp., pf.	66¾	66	66¾
Certain-Teed Products Corp.	8⅜	7⅛	7⅜
Certain-Teed Products Corp., pf.	36⅜	32⅝	34⅛
Champion Paper & Fibre Co.	23⅛	22½	22¾
Champion Paper & Fibre Co., pf.	105¼	105¼	105¼
Congoleum-Nairn Co.	24⅜	23⅝	24¼
Container Corp. of America	16½	15¾	16⅛
Continental-Diamond Fibre Co.	7¼	7⅛	7⅛
Crown-Zellerbach Co.	16⅞	16⅛	16⅜
Crown-Zellerbach Co., pf.	89	89	89
Flintkote Co.	20⅜	19¾	19⅞
Robert Gair	3¾	3⅜	3⅜
Robert Gair, pf.	17¼	14⅞	16½
International Paper & Power	13⅞	13	13⅛
International Paper & Power, pf.	59⅛	56¼	57¾
Johns-Manville Corp.	72½	70¾	70¾
Johns-Manville Corp., pf.	126	125	126
Kimberly Clark Corp.	36¼	36¼	36¼
MacAndrews & Forbes	34	33⅞	33⅞
Masonite Corp.	38	37½	37½
Mead Corp.	10¾	10⅜	10¾
Mead Corp., pf.	64	64	64
Paraffine Companies, Inc.	43½	43	43½
Rayonier, Inc.	17⅛	17⅛	17¼
Rayonier, Inc., pf.	28½	27⅜	28¼
Ruberoid Co.	19½	19⅛	19½
Scott Paper Co.	46¾	46⅛	46⅜
Sutherland Paper Co.	29⅜	28⅞	29¼
Union Bag & Paper Corp.	14½	13¾	13⅞
United Paperboard Co.	4½	4⅛	4⅜
U. S. Gypsum Co.	86⅜	85½	85½
U. S. Gypsum Co., pf.	179½	177	179½

New York Curb Exchange

High, Low and Last for the Week Ending February 21, 1940

	High	Low	Last
American Box Board Co.	6¼	6¼	6¼
Brown Co., pf.	26	24	24½
Great Northern Paper	43¼	43	43
National Container Corp.	11¼	10½	10½
St. Regis Paper Co.	2⅞	2¾	2⅞
St. Regis Paper Co., pf.	69¾	68	68
Taggart Corp.	5¼	5	5⅛

Hoberg Paper Mills Reelect Officers

[FROM OUR REGULAR CORRESPONDENT]

GREEN BAY, Wis., February 19, 1940—All officers and directors of Hoberg Paper Mills, Inc., were reelected at the annual meetings of the stockholders and board at the company's offices last week.

Reports showed net profits of $187,000 for 1939 after all expenses excepting allowance for dividends. This compared with a net of $66,000 in 1938. Common and preferred stock dividends last year amounted to $62,000, of which $40,000 was on preferred shares. Sales of the company last year were $3,765,000 as compared to $3,663,000 in 1938.

Reelected officers are: J. M. Conway, president and general manager; Thomas J. Dee, Chicago, vice-president; H. G. Wintgens, vice-president; P. M. Chiuminatto, secretary-treasurer, and G. L. Hopkins, assistant secretary-treasurer. Directors in addition to Messrs. Conway, Dee and Wintgens are: Dr. C. E. Albright, Milwaukee; Robert W. Baird, Milwaukee; William Hoberg, Green Bay; W. Y. C. Hunt, Summit, N. J., and Dr. J. R. Minahan and C. R. Phenicie, Green Bay.

The annual meeting of the company's subsidiary, Hudson-Sharp Machine Company, also was held, and the incumbents reelected. Mr. Conway is the president; S. J. Campbell, vice-president; Mr. Chiuminatto, secretary, and W. J. Poirier, treasurer. Messrs. Phenicie, Baird, Conway, Campbell, Minahan and J. P. Francois are on the board of directors.

S. D. Warren Co. Earnings Increase

Due to a lift in the second half-year and especially in the final quarter, S. D. Warren Company, makers of fine papers, had a substantial increase in earnings in 1939, reporting for the period net after interest, depreciation and taxes of $465,916, equal to $4.59 per share on the 101,387 shares of stock outstanding, which compared with net in 1938 of $164,364, equal to $1.62 per share.

Dollar sales increased 21.1 per cent last year to $9,775,641. Because prices for the year as a whole were 2.7 per cent lower than in 1938, the gain in tonnage sales was larger, at 24.4 per cent. Prices were off in the first three quarters of the year, but were marked up in the fourth quarter, and are now above the level of a year ago. Wage costs are also higher, as the company effected an increase of around 5 per cent at the first of January, duplicating an increase of a year ago, and restoring the company's peak wage level. In the final quarter of last year operations were advanced to full capacity, 24 hours per day, six days a week, a rate still in effect.

As of December 31, 1939, S. D. Warren Company had current assets of $3,661,933 and current liabilities of $630,251, making net working capital $3,031,-682, which compared with working capital of $2,941,-565 as of December 31, 1938.

Scott Paper Co. Shows Gain

The Scott Paper Company, maker and distributor of toilet tissue and paper towels, had net earnings of $1,736,093 in 1939, an increase of $356,143 over the previous year, according to the annual report of Thomas B. McCabe, president, issued for publication today. Calculated on the 653,391 shares outstanding at the year end, the earnings were equivalent to $2.65 a share, against $2.11 in 1938.

Quarterly dividends of 40 cents a share were paid on the common stock last year with an extra disbursement of 25 cents in the final quarter, totaling $1.25 a share for the year, or 60 cents more than the year before. Net earnings of $563,738 were transferred to the surplus account.

"Net sales continued to increase in 1939 and attained a new high record of $18,516,000, an increase of 14.5 per cent over the previous year," Mr. McCabe said in his annual message to shareholders. Additions and changes made to the company's plant at Chester, Pa., last year required total capital additions of about $2,900,000. The company has no funded debt.

Bartgis Bros. Make Good Report

The financial statement of the Bartgis Brothers Company for the year ended December 31, 1939, has been submitted in part as follows by E. H. Lupton, president. Net sales totaled $954,105.73 which is approximately 21 per cent increase over 1938 and 13 per cent increase over 1937.

The net income after all charges, including depreciation, but before deducting Federal and State in-

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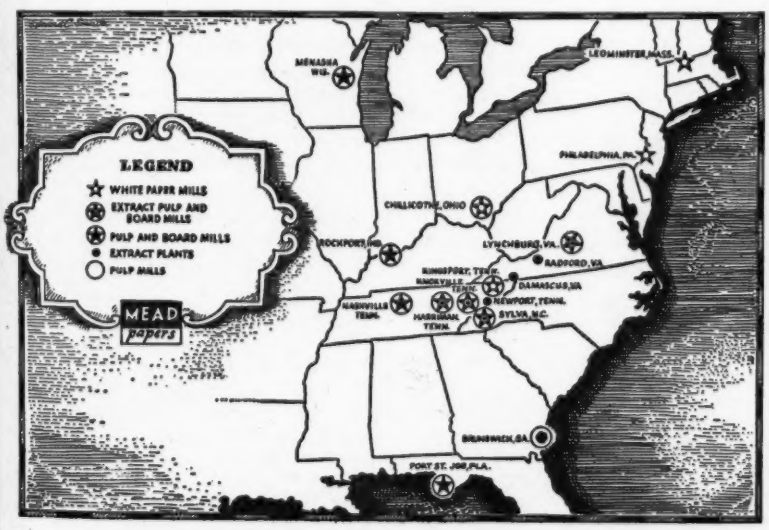
TORONTO CANADA

A SERVICE IN PAPER AND TWINE THAT WAS ESTABLISHED IN 1855



PAPER AND PULP MILLS
CHILLICOTHE, OHIO
KINGSPORT, TENN.
BRUNSWICK, GA. (50% Ownership)

BOARD MILLS
KNOXVILLE, TENN. LYNCHBURG, VA.
NASHVILLE, TENN. SYLVA, N. C.
HARRIMAN, TENN. PORT ST. JOE, FLA. (50% Ownership)

EXTRACT PLANTS
KNOXVILLE, TENN. LYNCHBURG, VA.
NEWPORT, TENN. RADFORD, VA.
HARRIMAN, TENN. SYLVA, N. C.

WHEELWRIGHT DIVISION
WHEELWRIGHT PAPER COMPANY
LEOMINSTER, MASS.

DILL & COLLINS SUBSIDIARY
DILL & COLLINS INC.
PHILADELPHIA, PENNA.

THE MEAD CORPORATION
CHILLICOTHE, OHIO
Paper, Pulp, Paper Board, Chestnut Extract

THE MEAD SALES COMPANY
230 PARK AVENUE, NEW YORK CITY
BOSTON CHICAGO DAYTON PHILADELPHIA

come taxes, amounted to $85,001.60. After deduction of Federal and State income taxes the net income amounted to $68,110.82. Preferred dividends amounted to $10,974.37 leaving $57,136.45 equal to 52c per share on the 108,052 common shares outstanding on December 31st, 1939. This compares with 51c per share for 1938. Preferred dividends have been paid regularly but because of plant improvements and additions, no common dividends were paid in 1939.

The tons of paperboard produced were 16,665 tons of which 16,445 tons were converted into folding cartons. We produced 15,231 tons in 1938, 14,320 tons in 1937 and 12,088 tons in 1936.

Champion Reports $486,849

The Champion Paper and Fibre Company and subsidiaries report as follows for the twelve weeks ended February 4: Consolidated net income, $486,849, equal to 67 cents a common share after provision for accrual of preferred dividends, compared with $222,438, or about 21 cents a common share, for twelve weeks ended January 29, 1939. Forty weeks ended February 4: Consolidated net income, $1,212,654, or $1.52 a common share. This income includes $401,757, representing non-recurring net proceeds of life insurance policies. Net income for forty weeks ended January 29, 1939, was $233,384.

Great Lakes Net $236,936

The Great Lakes Paper Company, Ltd. reports as follows for 1939:—Net profit, $236,936, equivalent to $1.17 each on the combined 100,000 shares of $2 class A and 100,000 shares of class B participating preferred shares, compared with $134,491, or 67 cents a share on the class A and B preferred stocks in 1938. Both series were $7.50 a share in arrears on December 30, 1939.

Oxford Paper Co. Reports $673,787

The Oxford Paper Company and subsidiaries report as follows for 1939:—Net income, $673,787, equal after $6 preferred and preference dividend requirements to 42 cents each on 380,735 common shares, compared with 1938 net of $159,420, or $1.56 each on 100,244 preference shares, after dividend requirements on $6 preferred stock.

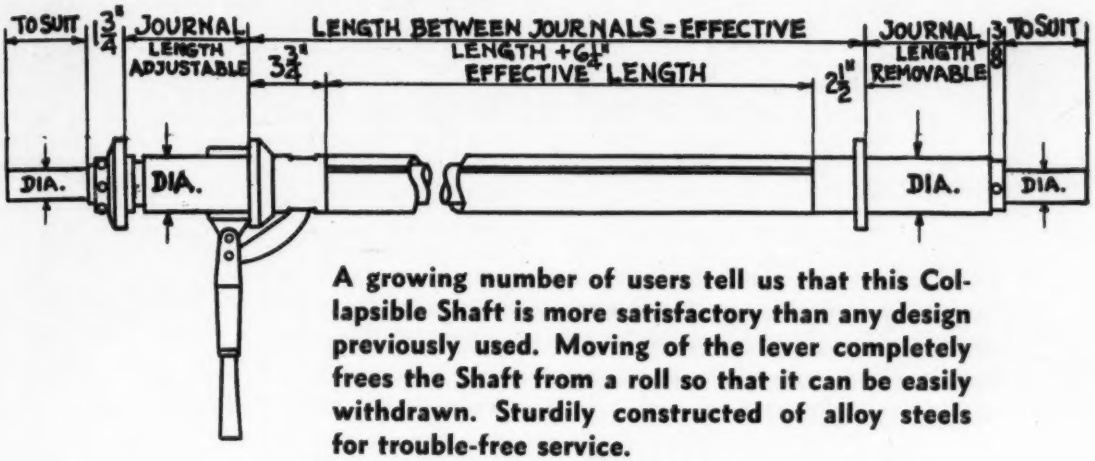
A.P.W. Reports for Twenty-eight Weeks

The A. P. W. Paper Company reports as follows for the twenty-eight weeks ended January 13: Net profit, $46,369. No provision for additional contingent interest of 1 per cent on first mortgage bonds with warrants. Full interest has been accrued on the twenty-five-year 6 per cent convertible notes.

Picture Taken January 27, 1940, Shows Progress of Construction on New $3,500,000 Paper Mill of The Champion Paper and Fibre Company at Houston, Tex.

LANGDON COLLAPSIBLE WINDER SHAFT

U. S. Patents 1631538-1811237-1931556



A growing number of users tell us that this Collapsible Shaft is more satisfactory than any design previously used. Moving of the lever completely frees the Shaft from a roll so that it can be easily withdrawn. Sturdily constructed of alloy steels for trouble-free service.

Licensees for Texas, Louisiana, Arkansas and East of the Mississippi.

Montague Machine Company

Turners Falls, Mass.

NORMAN P. SCOTT
WALTER S. HODGES
JOHN L. PURDY
FRANK B. EILERS
WES CASPARIS
MEET THE MEN WHO SELL ORR FELTS
If you have a felt problem, here are the men to help you solve it.
Mr. Eilers, dean of the "force," has been contacting the mills, for many years. The same holds true of Messrs. Purdy, Scott, Hodges and Casparis. If these men have cooperated on one felt problem, they have cooperated on a thousand. Why not take advantage of their broad experience?
And remember this—the superior water removal qualities and longer wear of Orr Felts account for the Orr plant being the largest felt mill in the world.
THE ORR FELT AND BLANKET COMPANY
Piqua, Ohio
ORR FELTS

CONSTRUCTION NEWS

New York, N. Y.—The Udine Paper Company, Inc., organized to operate a paper-converting plant for preparation of stocks for different purposes, has leased the three-story building, 25 x 92 feet, at 445 West Seventeeth street, and will improve and equip for immediate occupancy.

Los Angeles, Calif.—The Schumacher Wall Board Corporation, 5721 South San Pedro street, Los Angeles, manufacturer of wall board and kindred products, has filed plans for new one-story addition to plant at 4301 Firestone boulevard, South Gate district, and will carry out erection by day labor. Work will be placed under way at once. No estimate of cost announced.

Savannah, Tenn.—The Tennessee Valley Paper Mills, Inc., 720 Market street, Knoxville, Tenn., recently organized under Delaware laws, has awarded general contract to Merritt-Chapman & Scott Corporation, 17 Battery place, New York, N. Y., for erection of proposed new pulp and paper mill in Hardin County, near Savannah, recently referred to in these columns. Plant will be used for the production of newsprint and will consist of a group of large one and multi-story units, with storage and distributing buildings, power house, pumping station, machine shop, service buildings and other structures. Mill will be completely electrified, with power supply to be secured from transmission system of Tennessee Valley Authority, with which contract has been made for electric requirements. Work on new mill is scheduled to begin at early date, with completion early in 1941. Mill is estimated to cost over $4,000,000, and company is concluding financing in gross amount of $6,000,000 through loan of $3,420,000 from Reconstruction Finance Corporation, Washington, D. C., and sale of stock issue for remainder of fund. Extensive tracts of timber lands have been secured in vicinity of mill, to be developed for pulp wood supply. Gordon Browning, Huntingdon, Tenn., former Governor of Tennessee, is president of new company, and S. W. Duggan, secretary.

Detroit, Mich.—Fire recently damaged portion of storage and distributing building of the Levine Waste Paper Company, 1590 Gillette avenue, Detroit. An official estimate of loss has not been announced. The damage will be replaced.

Marcus Hook, Pa.—The American Viscose Corporation, Marcus Hook, manufacturer of cellulose rayon products, is reported to be arranging for early purchase of tract of land in Southern part of country, as site for new mill. Proposed plant will consist of several large one and multi-story buildings, with power house, pumping station, mechanical shops and other operating units. Entire project will cost over $4,000,000, with equipment.

Meridian, Miss.—The Flintkote Company, 50 West 50th street, New York, N. Y., manufacturer of roll roofing, etc., has approved plans for proposed new mill in the vicinity of Meridian, recently referred to in these columns, where company has secured a large tract of land. New plant will be used for the production of insulating board and wall board specialties. Plant will consist of a main one-story mill, 300 x 1200 feet, and number of miscellaneous buildings, with power house, pumping station and machine shop. It will be equipped for an initial capacity of close to 5,500,000 square feet of insulating and other board products per month, with facilities for employment of about 300 persons. Erection is scheduled to begin in March, with completion early in 1941. Plant will use Southern pine for raw material and company is arranging for extensive development of such timber properties in vicinity of mill for pulp wood supply. Entire project is estimated to cost about $2,000,000, instead of a smaller sum previously mentioned. I. J. Harvey, Jr., is president. The City Council at Meridian is considering the construction of a waterworks station near mill site for water supply for plant, estimated to cost approximately $100,000, and a bond issue in that amount is proposed by the municipality for this work.

Combined Locks, Wis.—The Green Bay and Mississippi Canal Company, Combined Locks, is planning early rebuilding of portion of local wood pulp storage and distributing building, recently destroyed by fire. An official estimate of loss has not been announced.

Lisbon Falls, Me.—The United States Gypsum Company, 300 West Adams street, Chicago, Ill., manufacturer of wall board, wood pulp insulating board, etc., has awarded general contract to the Brown Construction Company, 562 Congress street, Portland, Me., for new one-story addition to branch mill at Lisbon Falls, 70 x 155 feet, to be used for storage and distribution.

New Companies

Brooklyn, N. Y.—The North Seventh Street Paper Mills, Inc., has been incorporated with capital of $10,000, to manufacture and deal in paper products. New company is represented by the Continental Lawyers Albany Service, Inc., 305 Broadway, New York, N. Y.

Chicago, Ill.—Carton Finishers, Inc., 231 South La Salle street, has been organized with capital of 4000 shares of stock, no par value, to manufacture paper boxes, cartons, etc. of various kinds. The incorporators include Ned P. Veatch and Herman J. Taylor.

Niagara Falls, N. Y.—The Asbestos-Asphalt Corporation has been chartered with capital of 200 shares of stock, no par value, to manufacture and deal in roofing and building papers, etc. New company is represented by Saperston, McNaughton & Saperston, Liberty Bank Building, Buffalo, N. Y., attorneys.

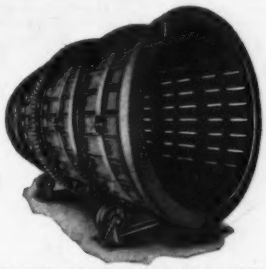
Boston, Mass.—The Brooks Paper Company, Essex Station, has filed notice of company organization to deal in paper goods. P. C. Brooks, 4349 Washington street, Roslindale, Boston, is head.

NEW MURRAY KNOT DRILL — On Bleaching Equipment that we are now manufacturing, we are associated with the Pulp Bleaching Company. Ask for details.

MURRAY

WOOD ROOM AND PAPER MILL ....EQUIPMENT

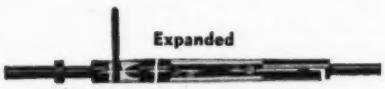
Backed by a plant and organization that for over half a century have been building heavy and special machinery—always keeping pace with changes in the industry and developing new machines to meet those changes. Our engineering services are always available to help you solve your mill problems. Write for information on our new complete line of wood cleaning equipment.



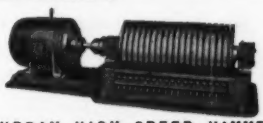
MURRAY-BRANCH BARKING DRUM—Not a rivet in it—the shoulders, not the bolts, do the work.

VERTICAL HEAD WOOD CLEANER — will handle large diameter and long lengths with least effort by operator — one operator only required for each machine.

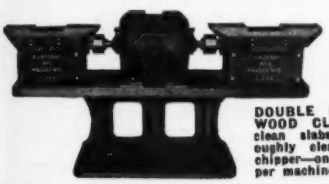
MURRAY PULPWOOD CHIPPER — produces better chips, saves power and mill space—no vibration.



COLLAPSIBLE WINDER SHAFTS—milled out of solid steel, easily inserted or removed from rolls—will stand abuse and give maximum service.



MURRAY HIGH SPEED HAMMER CRUSHER—all purpose machine that reduces rejects from chip screen.



DOUBLE OR SINGLE HEAD WOOD CLEANER—designed to clean slabs and edgings—thoroughly cleans wood ready for chipper—one operator required per machine.

D. J. Murray Mfg. Co.

WAUSAU ~ WISCONSIN.

KALAMAZOO

TILE CHEST

Adapted for Use with Agi-flo Pump

The Shartle Agi-flo agitates and delivers the stock. The Kalamazoo Glazed Tile Chest gives you the advantages of low cost storage and the utmost in cleanliness.

More than 700 installations of Kalamazoo Glazed Tile Tanks now in use prove their unvarying dependability. For maximum efficiency plan to use a Kalamazoo Chest with your next Agi-flo, or any other type of agitator.

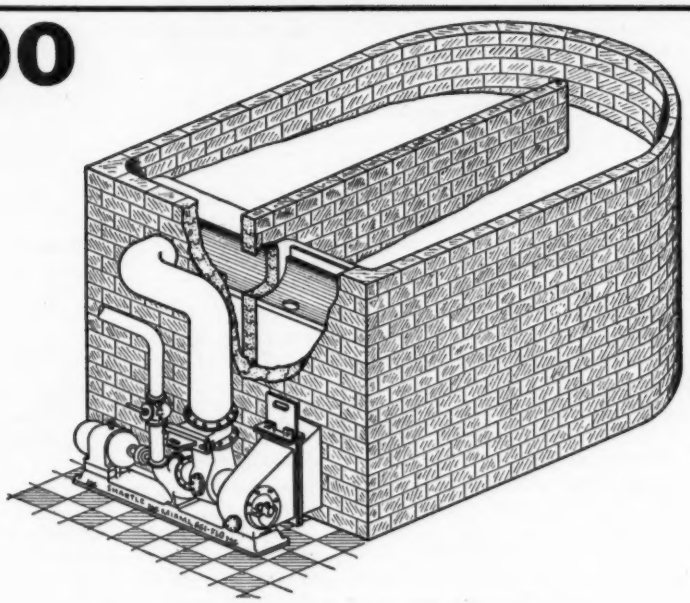


Illustration courtesy of Shartle Brothers Machine Company, manufacturers of the Shartle Agi-flo Pump.

GLAZED TILE

KALAMAZOO TANK & SILO CO.

KALAMAZOO, MICHIGAN

WOOD

PAPER TRADE JOURNAL
Title Reg. U. S. Pat. Off.

Henry J. Berger
EDITOR

Vol. 110 February 22, 1940 No. 8

THE YEAR IN PAPER

The American paper industry established a new high record of production in 1939. The total production of all kinds of paper is estimated at 13,441,500 tons against a capacity of 16,250,000 tons. The operating ratio for the whole industry averaged 83 per cent. This compares with a production of 11,380,814 tons and a capacity of 16,191,000 tons for 1938, and with a production of 12,837,003 tons and a capacity of 15,572,850 tons for 1937. The best showing of actual production against capacity was made in newsprint which equalled capacity or 100 per cent, tissue paper 93 per cent, wrapping paper 88 per cent, writing paper 86 per cent, groundwood paper 83 per cent, down to cover paper at 61 per cent.

Newsprint production in North America for 1939 was 4,116,000 tons, of which Canada produced 2,869,000 tons or 69.7 per cent, the United States 939,000 tons or 22.8 per cent, and Newfoundland 308,000 tons or 7.5 per cent. This is 827,000 tons or 16.7 per cent below the peak production year of 1937. The gain in Canadian production was 245,000 tons or 9.3 per cent, the increase in the United States was 119,000 tons or 14.6 per cent, and the gain in Newfoundland was 40,000 or 14.8 per cent. Production in the United States was about equal to the average since 1932, which was the latest year when output reached one million tons. The price situation was satisfactory for the year with newsprint in rolls quoted at from $48 to $50 per ton.

Canadian newsprint mills were operating at about 65 per cent of capacity prior to the outbreak of hostilities in Europe. During the first quarter of 1939, production was at a lower ratio than in 1938. The improvement in general business increased the demand and consumption of newsprint and in the last quarter of the year production rose to 75 per cent of capacity. Canadian newsprint mills operated at an average ratio of 66.8 per cent in 1939, compared with 62.4 per cent in 1938 and with 93.9 per cent in 1937.

Newsprint shipments from Canada for 1939 were valued at $115,685,970, compared with $104,615,042 for 1938. Exports to the United States totaled 2,206,000 tons or 83 per cent, a gain of 268,000 tons or 13.8 per cent over 1938. Canadian exports of newsprint overseas in 1939 amounted to 452,000 tons, a decrease of 34,000 tons from 1938, due to hostilities in Europe. Overseas shipments from Newfoundland last year amounted to 177,000 tons, which was 27,000 tons less than in 1938. Since 1937, Canada's exports of newsprint have surpassed those of wheat.

Book paper production in 1939 totaled 1,377,000 tons, which was 19.5 per cent higher than in 1938 and 2 per cent under 1937. The output of coated book paper amounted to 290,000 tons or 24.5 per cent higher than in 1938 and 10 per cent less than in 1937. Production in the first nine months was about 14 per cent higher than in 1938 and in October output rose to 30 per cent above the previous year. Shipments of uncoated book paper were 20.3 per cent higher than in 1938, but dollar sales were only 13.5 per cent higher, due to the lower average price per pound in 1939 compared with 1938.

Kraft paper shipments in 1939 set up a new all-time record. Shipments were 16 per cent greater than in 1938 and 12 per cent above 1937, the best previous year. During the first half of 1939 the demand for kraft paper was running at about 20 per cent above the like period in 1938. The start of hostilities in Europe created a buying boom and for several weeks orders climbed to new high peaks. By the end of the year the situation had levelled off, the backlog of orders had been reduced and current purchasing was fairly well balanced with consumption. Kraft paper manufacturers enter 1940 with the belief that the current year will be a good one, despite the obvious uncertainties, and feel confident of their ability to meet any reasonable demands.

Writing paper production in 1939 amounted to an estimated 612,000 tons against a capacity of 710,310 tons, compared with a production of 511,716 tons in 1938 and with 582,147 tons in 1937. Consumption of writing paper in 1939 is estimated at about 12 per cent higher than in 1938. Exports, prior to the European conflict, were at the rate of 2.8 per cent of domestic production. After the start of the conflict exports rose and reached 6 per cent of domestic production in December.

Paper board production in 1939 reached an all-time peak estimated at 5,910,000 tons, or 71 per cent of capacity. This is 10.7 per cent above the 4,896,100 tons produced in 1938, and 7.2 per cent above the 5,510,000 tons in 1937. Boxboard gained 495,000 tons or 20.4 per cent over 1938. In the container grades, kraft boards made the largest gain. During the first half of 1939, despite good production, price levels were low and consumer buying was largely for immediate needs. Improvement began in September following the start of hostilities in Europe. The buying splurge reached its peak in October and at the close of 1939 normal conditions prevailed with a substantial backlog of orders carried into 1940.

Domestic production of wood pulp made a new high record in 1939 with an estimated 7,107,000 tons, against a capacity of 9,083,705 tons. This compares with an output of 5,975,000 tons and a capacity of 8,729,819 tons in 1938, and with an output of 6,572,-918 tons and a capacity of 7,674,567 tons in 1937, which was the previous high record. Total imports of wood pulp of all kinds for 1939 amounted to 2,026,-209 tons. Exports totaled 139,504 tons. Shipments from Europe during the first four months of the European conflict were 18 per cent higher than in 1938, but 1 per cent less than in 1937. Total imports of pulp from all sources for these four months were 26 per cent higher than in 1938, and 8 per cent larger than in 1937. Total wood pulp exports from Canada in 1939 had a value of $31,000,602, compared with $27,730,738 in 1938. Exports from Canada are relatively small as the bulk of the output is used in manufacturing newsprint.

Newsprint Production Expands

Production of newsprint in Canada during January 1940 amounted to 251,032 tons and shipments to 244,273 tons, according to the News Print Service Bureau. Production in the United States was 84,126 tons and shipments 80,959 tons, making a total United States and Canadian news print production of 335,158 tons and shipments of 325,232 tons. During January, 32,045 tons of news print were made in Newfoundland, so that the total North American production for the month amounted to 367,203 tons. Total production in January 1939 was 308,189 tons.

The Canadian mills produced 42,650 tons more in January 1940 than in January 1939, which was an increase of twenty and five tenths per cent. The output in the United States was 6,862 tons or eight and nine tenths per cent more than in January 1939, in Newfoundland production was 9,502 tons or forty-two and two tenths per cent more, making a total increase of 59,014 tons, or nineteen and one tenth per cent more than in January 1939.

Stocks of news print paper at the end of January were 176,261 tons at Canadian mills and 16,119 tons at United States mills, making a combined total of 192,380 tons compared with 182,454 tons on December 31, 1939. During the winter some tonnage is accumulating at points from which water shipments will later be made.

To Make Pulp in Netherlands Indies

The manufacture of chemical pulp is being planned by the Forestry Department of the Government of the Netherlands Indies in conjunction with governmental agricultural enterprises. Plans for producing chemical pulp in this country have been proposed from time to time during recent years, one of which was for the establishment of a plant for supplying the raw material required by European cellulose processing mills. German mills particularly showed great interest in this plan.

Other plans, it is reported, relate to the establishment of a paper mill which would consume the cellulose obtained locally.

Production Ratio Report

These statistics are based upon paper production reports to the American Paper and Pulp Association.

COMPARATIVE MONTHLY SUMMARIES[1]

Months	1940	1939	1938	1937	1936	1935	1934
January	91.0%	77.5%	63.9%	90.3%	76.1%	65.8%	.....
February	.....	81.7%	68.7%	90.1%	77.9%	70.0%	.....
March	.....	84.0%	69.6%	90.3%	76.0%	70.5%	.....
April	.....	82.9%	68.3%	92.1%	82.3%	70.0%	.....
May	.....	80.2%	69.0%	90.6%	81.6%	69.4%	.....
June	.....	79.7%	66.0%	87.3%	80.7%	72.3%	.....
July	.....	75.2%	72.0%	81.8%	77.3%	64.9%	.....
August	.....	82.9%	77.2%	82.9%	81.5%	70.9%	.....
September	.....	88.7%	76.3%	78.6%	80.5%	71.9%	58.2%
October	.....	96.6%	82.5%	73.5%	87.6%	75.6%	64.7%
November	.....	97.2%	79.6%	61.9%	88.0%	75.3%	61.7%
December	.....	91.1%	74.4%	54.5%	85.9%	71.2%	59.6%
Year Average	.....	84.9%	72.3%	80.6%	81.3%	70.5%	.....
First 6 weeks	90.9%	78.9%	65.1%	89.9%	76.5%	66.4%	.....

COMPARATIVE WEEKLY SUMMARIES[1]

CURRENT WEEKS, 1940		CORRESPONDING WEEKS, 1939	
January 6	88.5%	January 7	70.0%
January 13	93.4%	January 14	80.4%
January 20	91.1%	January 21	78.0%
January 27	92.0%	January 28	81.4%
February 3	90.0%	February 4	80.7%
*February 10	89.5%	February 11	82.8%

The following statistics show the number of mills reporting by ratio groups:

	Number of Mills Reporting—Current Weeks					
Ratio Limits	Jan. 6, 1940	Jan. 13, 1940	Jan. 20, 1940	Jan. 27, 1940	Feb. 3, 1940	Feb. 10, 1940
0% to 50%	53	47	38	47	43	29
51% to 100%	245	251	256	247	244	145
Total Mills Reporting	298	298	294	294	287	174

PAPERBOARD OPERATING RATIOS

Per cents of operation based on "Inch-Hours" reported to the National Paperboard Association:

Year	Jan.	Feb.	Mar.	Apr.	May	June	July
1936	62%	67%	67%	70%	69%	70%	69%
1937	80%	86%	86%	88%	85%	77%	66%
1938	54%	60%	61%	57%	58%	56%	57%
1939	60%	67%	71%	69%	64%	67%	63%
1940	71%	....	....	....	....	....	....

Year	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1936	75%	78%	82%	80%	74%	72%
1937	74%	69%	65%	55%	45%	73%
1938	66%	66%	70%	65%	59%	61%
1939	72%	74%	84%	81%	71%	70%

Week end. Jan. 6, 1940—65%
Week end. Jan. 13, 1940—74%
Week end. Jan. 20, 1940—72%
Week end. Jan. 27, 1940—75%
Week end. Feb. 3, 1940—72%
Week end. Feb. 10, 1940—71%

[1] Production-capacity ratios are based upon six-day capacity ratings which are adjusted periodically to correspond with the ratings reported by individual companies. Ratios are subject to revision until all reports are received.

* Preliminary figure.

A. C. Babson To Address Waste Dealers

The convention committee of the National Association of Waste Material Dealers, Inc., announces that Arthur C. Babson of the Babson's Statistical Agency, Wellesley, Mass. will be a guest speaker at the opening session of its twenty-seventh annual convention. Mr. Babson who has just completed a wide swing around the country and is thoroughly conversant with economic conditions not only in this country but abroad is bound to bring to the delegates assembled at the convention a comprehensive picture of the business situation as it exists today and the outlook for the months that are ahead.

The committee urges every delegate planning to attend the Convention to be on hand at the Hotel Astor for the opening session Monday, March 18 at 2:30 P.M. at which time Mr. Babson will address the delegates.

UNION SCREEN PLATES

Recognized as the World's Standard

Over 50 years experience in the making of Screen Plates has enabled us to produce plates of such uniformity and precision that they are recognized as "standard" all over the world.

Union Bronze Blanks are cast in our own foundry to our own exacting formulas—compounded to give the maximum length of service. They are cut and finished in our own plant which is equipped with the most efficient machines and methods.

Screen Plates of any style of cut and any number of slots per inch which it is mechanically possible to manufacture, can be furnished by us.

UNION SCREEN PLATE CO.

FITCHBURG, MASSACHUSETTS

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